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- Precision-ground cast iron table size: 14" sq.
- Table tilt: 45° R, 15° L
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Blade size: 92½"–93½" L (⅛"–¾" W)
- Blade speeds: 1500 & 3200 FPM
- Approx. shipping weight: 196 lbs.

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G0555P ~~$545.00~~ SALE $495.00

10" HYBRID TABLE SAW WITH RIVING KNIFE

- Motor: 2 HP, 110V/220V*, prewired to 220V, single-phase
- Amps: 16A at 110V, 8A at 220V
- Precision-ground cast iron table with wings measures: 40" W x 27" D
- Table height: 34"
- Footprint: 20" L x 21½" W
- Arbor: ⅝" • Arbor speed: 3850 RPM
- Capacity @ 90°: 3⅛"
- Capacity @ 45°: 2³⁄₁₆"
- Rip capacity: 30" right, 12" left
- Overall size: 60" W x 40" H x 36" D
- Approx. shipping weight: 416 lbs.

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G0715P ~~$825.00~~ SALE $775.00

8" X 72" JOINTER WITH MOBILE BASE

- Motor: 3 HP, 240V, single-phase, TEFC, 3450 RPM, 15A
- Precision-ground cast iron table size: 9" x 72½"
- Cutterhead knives: 4 HSS, 8" x ¾" x ⅛"
- Cutterhead speed: 4800 RPM
- Cutterhead diameter: 3"
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- Motor: 2 HP, 110V/220V, single-phase, TEFC, 1725 RPM, prewired 220V
- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast iron table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37½"
- Cutting capacity/throat: 16¼" left
- Blade size: 131½" long
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15" PLANER

- Motor: 3 HP, 240V, single-phase, 15A
- Max. cutting width: 15" • Max. cutting depth: ⅛"
- Stock thickness: Max. 8", Min. 3⁄16"
- Min. stock length: 8"
- Feed rate: 16 and 30 FPM
- Cutterhead diameter: 3"
- Number of knives: 3
- Knife size: 15" x 1" x ⅛"
- Cutterhead speed: 4800 RPM
- Power feed rollers: solid serrated steel
- Table size: 15" x 20"
- Overall dimensions: 32½" wide x 45⅞" high x 42" deep
- Approx. shipping weight: 675 lbs.

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G0453 ~~$1150.00~~ SALE $1075.00

10" LEFT-TILTING SUPER HEAVY-DUTY TABLE SAW WITH RIVING KNIFE

- Motor: 3 HP, 240V, single-phase, 14A, 3450 RPM
- Cutting capacity: 8" L, 26" R
- Max. depth of cut @ 90°: 3"
- Max. depth of cut @ 45°: 2⅛"
- Table size (with 2 solid extension wings attached): 40" W x 27" D
- Base dimension: 20½" x 20½"
- Approx. shipping weight: 508 lbs.

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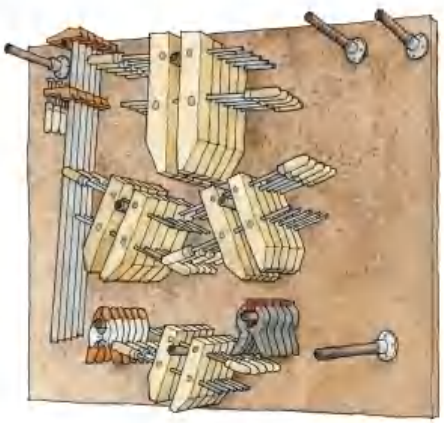

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SIMPLE CLAMP RACK

up front

19
QUIET, SNIPE-FREE PLANER

features

The Taunton Press
Inspiration for hands-on living®

Cover photo: Michael Pekovich

in the back

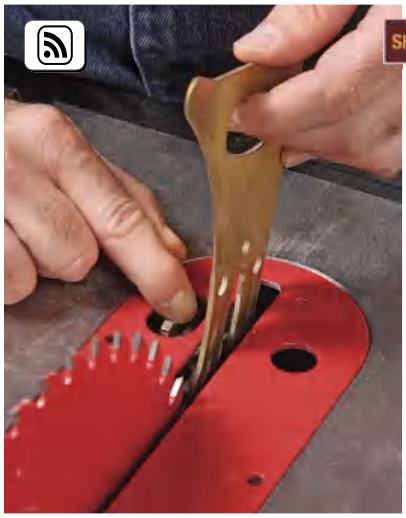
on the web

THIS MONTH ON FineWoodworking.com/extras

Visit our website to access free web tie-ins, available Oct. 30. While you're there, don't miss our collection of free content, including tool reviews, an extensive project gallery, and must-read blogs.

Installing a Vise

A cast-iron vise is easy to install and a great addition to any bench. Watch this video to learn how to mount one to your bench.



SHOP TALK LIVE

Tablesaws Put to the Test

Resident tool guru Roland Johnson takes a close look at midsize cabinet saws in this issue (p. 42). Listen in on a Shop Talk Live podcast where he talks about the most important features to look for in a new saw.

Marvelous Shopmade Machines

FWW editor Tom McKenna has unearthed a bevy of ingenious homemade woodworking machines in this issue's Looking Back department (p. 84). Read the original articles in their entirety, and you may just be inspired to make your own.

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Beefy Bench with Storage

When building this workbench (p. 32), staffers Matt Kenney and Mike Pekovich turned to the Shakers for guidance. Follow along from start to finish for tips on:

- Building a rock-solid post-and-beam base
- Adding drawers to a workbench
- Installing a twin-screw vise

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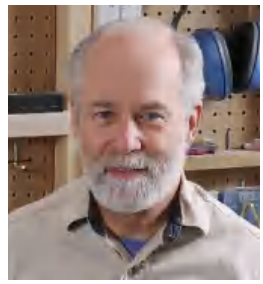
contributors

Dan Faia (*Open Rack for Hand Tools*) is a custom furniture maker and the head of the Cabinet and Furniture Making program at Boston's famed North Bennet Street School. In 2014, he was commissioned by the Bostonian Society to reproduce the Moses Gill Chippendale side chair for the Council Chamber at the Old State House in Boston. In addition, samples and video demonstrations of his wood carving went on display at the Museum of Fine Arts. When Faia isn't teaching, he is usually busy in the shop pursuing his passion for wood carving. Visit dcfwoodworking.com to learn more and see examples of his work.

Marshall Fletcher (*Bring Your Shop into the House*) comes from a long line of woodworkers. He still has his dad's No. 3 Stanley bench plane and a Rhodesian teak chest built by his grandfather. Born in Zimbabwe, Fletcher spent seven weeks after college traveling the United States. Later, when he got a resident visa, he had only four months to use or lose it so he sold his engineering business and arrived in Washington, D.C., with his wife, infant daughter, and a chest of favorite hand tools. "Selling most of your stuff is a very liberating experience," he says.

Contributing editor **Steve Latta** (*Restore a Vintage Vise*) sets a dazzling work pace. In addition to writing frequently for the magazine (more than 50 articles since 1994), he teaches full time in the furniture making program at Thaddeus Stevens College of Technology in Lancaster, Pa. He also teaches at nearby Millersville University and conducts workshops at woodworking schools across the country. In his spare time he builds period furniture, some of which he donates to nonprofit organizations. He prepared for all this activity by earning a bachelor's degree in literature and a master's in American decorative arts.



Douglas Campbell (*Clever Countertop*) credits a Sunday afternoon in 1961 spent with his grandfather learning to use a 1948 Craftsman tablesaw as his introduction to woodworking. Since retiring from a career as an architect, he enjoys the compressed realization time of woodworking projects compared to the months or years spent on large construction projects. His basement shop in Asheville, N.C., is part of a Platinum LEED-certified home he designed. LEED-certified buildings save money and resources while promoting renewable, clean energy.

For more information on our contributors, go to FineWoodworking.com/authors.

We are a reader-written magazine. To learn how to propose an article, go to FineWoodworking.com/submissions.

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Publisher	Renee Jordan 203-304-3572 rjordan@taunton.com
National Ad Director, Home & Construction	Brian Quinn 203-304-3569 bquinn@taunton.com
Senior Account Manager/ Integrated Media, Southeast, East Central	Noelle Kennedy 203-304-3530 nkennedy@taunton.com
Senior Account Manager/ Integrated Media, Northeast	Kelly Ames Smith 203-304-3840 ksmith@taunton.com
Senior Account Manager/ Integrated Media, Midwest, Northwest	Kevin Draz 708-386-1450 kdraz@taunton.com
Senior Account Manager/ Integrated Media, Southwest	Cynthia Lapporte Cynthia@oakmediagroup.com
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letters

From the Editor

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—Tom McKenna, editor

Assistant/Associate Editor

We are searching for an experienced writer/editor with a passion for woodworking and furniture making. You will travel to shops all across the country to document woodworking projects and techniques. You must be able to write and edit with clarity and to collaborate with our expert authors and in-house staff to create compelling content for both our print editions and our website. Photography experience is a plus.

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We are looking for a web producer with at least three years' experience. You will be responsible for all content on FineWoodworking.com, including videos, blogs, and our biweekly podcast, as well as identifying opportunities for web content and features. The successful candidate is a multitasking, dynamic self-starter who thrives in a collaborative environment. This is not just a technical position. Although you must have a basic understanding of HTML and how websites work, you also have to be a competent content producer skilled in shooting both videos and still photographs, and you should be comfortable both behind a camera and in front of it. The candidate must also display strong writing/editing and project management skills along with the use of site metrics, competitive analysis, and web trends.

Woodworking knowledge is a must, and familiarity with content management systems, PHP, video-editing processes, wireframing, Photoshop, and MS Office is a plus. You should also be comfortable with basic audio editing and e-letter production. Some travel is required.

Jig works as advertised

The box-hinge jig featured in *FWW* #249 works exactly as advertised. Like Matt Kenney, I have struggled with getting an exact fit when cutting mortises for small box hinges. I built this jig and got great results the first time out.

—AL THOMAS, Wake Forest, N.C.

Out with the old

I do not agree with Mr. Thrasher in the May/June letters (*FWW* #247, p. 10). New woodworkers may not have access to the plethora of past articles, and a recent issue with a dovetail how-to on the front may be just the information they need to generate interest. Also, I think if he looked up all past articles on plywood uses, glues, clamping, etc. he would find the same "problem." I, for one, like all articles, new and rerun. Keep them coming, even the ones about dovetails.

—LEONARD BYSTROM, Red Deer, Alta., Canada

More Victorian furniture, please

First off, let me say I love your magazine, am a happy subscriber, and have been for many years. But what distresses me is that I am never able to take advantage of the great furniture projects that you feature. They are all Craftsman, Shaker, or modern. None of these styles would be suitable in my Victorian-era home.

I know the skill level is higher but surely we can have a project once in awhile? I have searched your archives and cannot find a single example of a Victorian-era project going as far back as you do. I would love to be able to take advantage of what must be the best service you provide: your plan-articles. I cannot be alone here.

—RYAN CURRAN, Providence, R.I.

Improvement to a recent tip

I have been frustrated with the depth stop on my drill press since I got it and was glad to see the solution in my new copy of *FWW* (#249, Methods of Work, p. 13). I tried the method but found the soft pipe gave too much cushion with a loss of accuracy. I now use a ¾-in. length of ½-in. PEX plumbing pipe, which works like a charm with no loss of accuracy.

—JOHN PHILLIPS, Vancouver, B.C., Canada

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Fine Woodworking
The Taunton Press
63 South Main Street
PO Box 5506
Newtown, CT 06470-5506
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methods of work

EDITED AND DRAWN BY JIM RICHEY

Best Tip

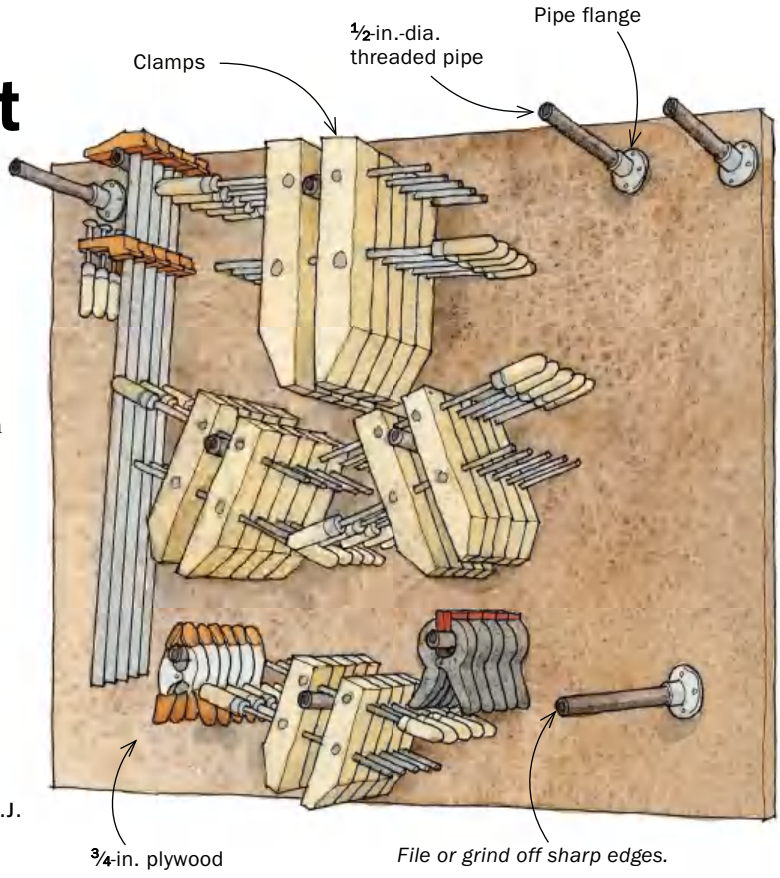
Simple, compact clamp storage

Ron Zielensky has been building projects for friends and clients since the 1970s. His latest are an altar, tabernacle table, and four other pieces for a remodel of his church. To connect these pieces to the past, he is using oak reclaimed from the old pews.

This wall-mounted rack holds a lot of clamps and only takes about 4 ft. of horizontal wall space. The clamps are arranged on varying lengths of threaded black pipe. The pipes are screwed into flanges, which are in turn screwed to a plywood base mounted to the wall. The pipes and flanges are readily available at hardware stores and home centers.

I played with the locations of the pipes so that nearly all the space on the plywood is used. A few long clamps—some of which hang off the bottom pipe and extend down to the floor—are missing for illustration purposes.

—RON ZIELENSKY, Long Valley, N.J.



A Reward for the Best Tip

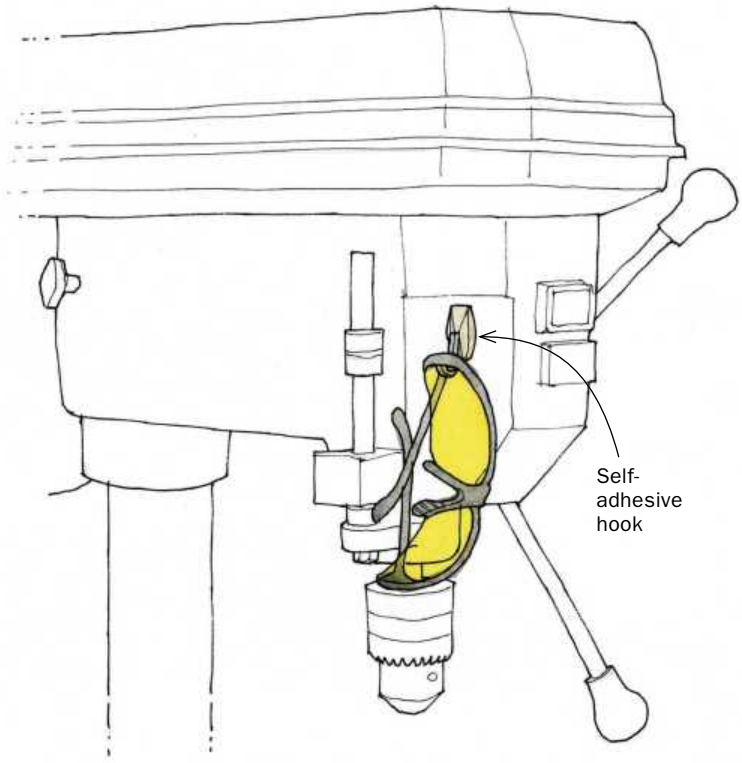
Send your original tips to fwmow@taunton.com or to Methods of Work, Fine Woodworking, P. O. Box 5506, Newtown, CT 06470. We pay $100 for a published tip with illustration; $50 for one without. The prize for this issue's best tip was a Veritas Mk. II Deluxe Honing Guide Set.

Safety glasses on every machine

I know I should always wear safety glasses while using power tools. But in the middle of a project it is easy to forget where I left them. If I'm in a hurry, I think, "It's just a quick job—I'll go without the glasses."

Finally I decided it was time to do better. I bought several self-adhesive hooks at the hardware store and applied them to all my power tools, placing them prominently near the power switch. I rounded up several pairs of safety glasses and hung one on each tool. Now I have no excuse for not wearing them.

—BILL WELLS, Olympia, Wash.



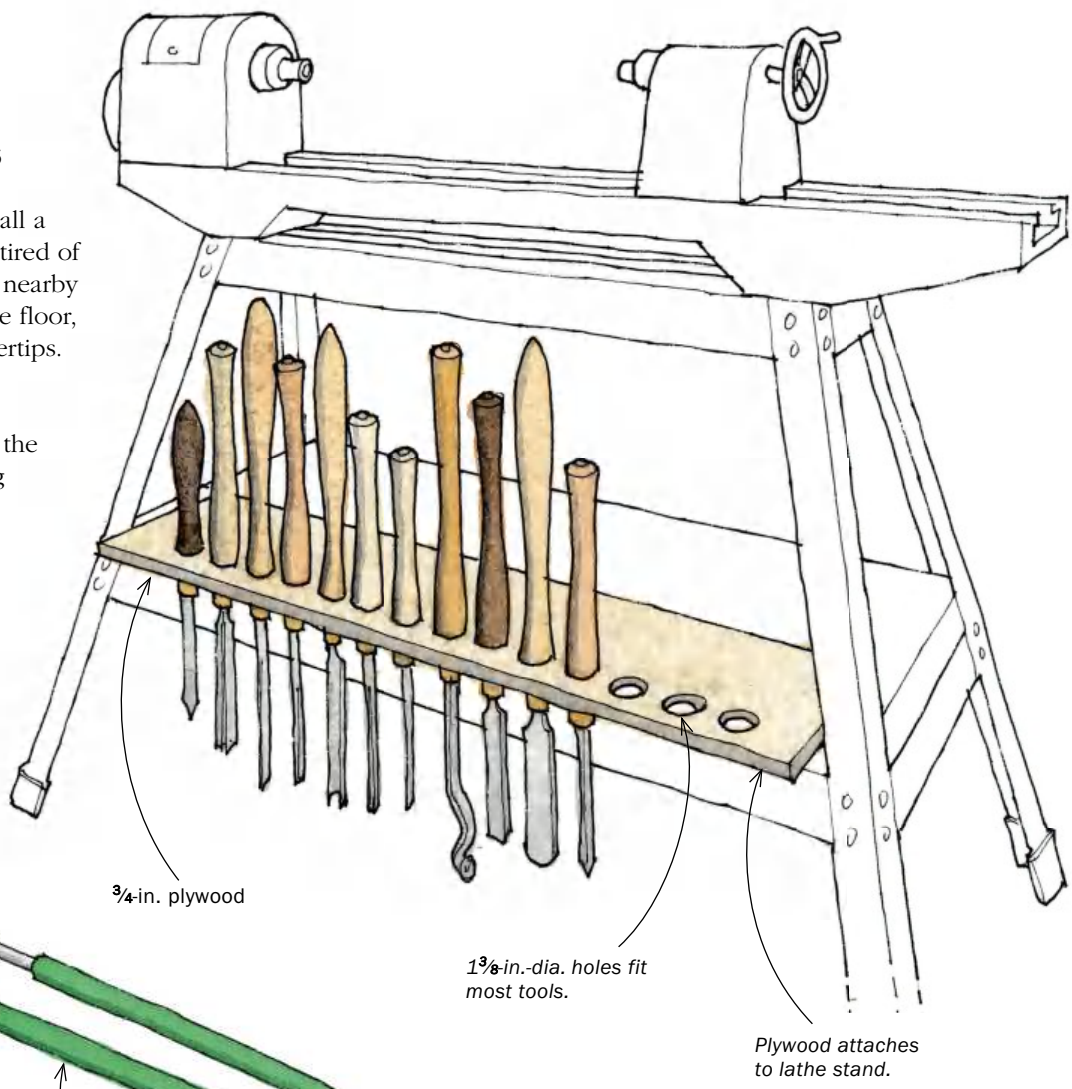
Handy storage for turning tools

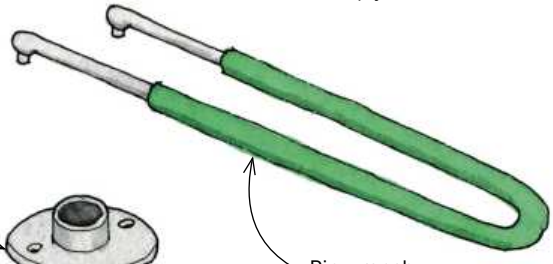
I don't have room over my lathe to install a wall rack for turning tools. When I got tired of walking and reaching to get tools off a nearby table, and picking up fallen tools off the floor, I found a way to keep them at my fingertips. The answer was below the lathe.

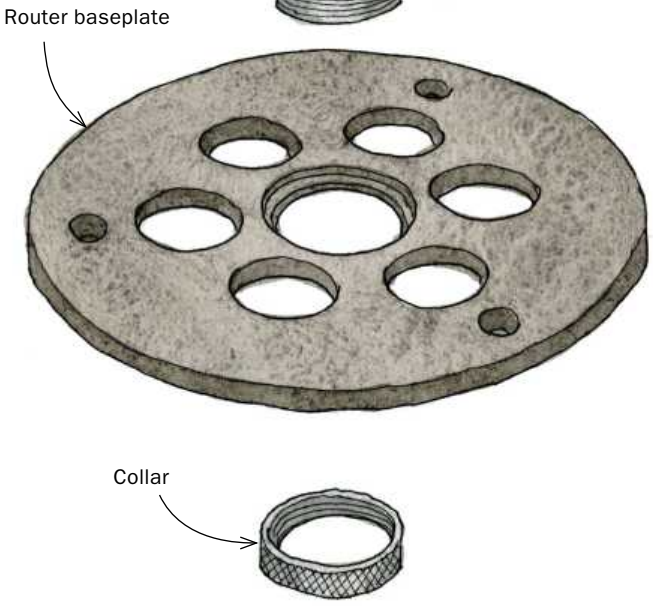
I simply drilled holes in a piece of plywood and attached it to the shelf in the base of my lathe stand, accommodating my most commonly used turning tools. A 1⅜-in.-dia. hole worked for all of the tools but two.

Now I can switch tools in seconds with a minimum of movement, faster than I could even if I had a wall-mounted rack.

—MICHAEL ROHRER, Minneapolis







Wrench for router guide bushings

I often use guide bushings in my router base to follow a template. Using only finger power, however, it's hard to get the bushings tight enough in the router base, and they sometimes work loose in use.

I've tried holding the bushing with pliers, but that tends to scar and deform it. Being a longtime cyclist and DIY bike mechanic, I found the answer in a familiar tool. Sold as an "adjustable pin wrench" or a "face spanner," this inexpensive tool is also used on angle grinders and other machines.

To make the wrench work, drill two holes in the face of the bushing. That lets the wrench hold the bushing in place while you use pliers of some kind to tighten the inside collar.

—DAN THRASHER, London, Ont., Canada

CELEBRATING 40 YEARS

Classic Tip

To mark *Fine Woodworking*'s 40th anniversary year, we are presenting some classic Methods of Work tips. Jim Richey has edited and illustrated the column since issue #16, and this is one of his first tips.

Make a froe from a leaf spring

The froe is a traditional tool for cleaving green wood that's enjoying a revival due to a renewed interest in "country" woodcraft. But the tool is rarely found through antique tool sources (I've never seen one) and new froes cost $23. Fortunately, for those of us with more time than cash, an excellent froe can be forged from a discarded auto spring.

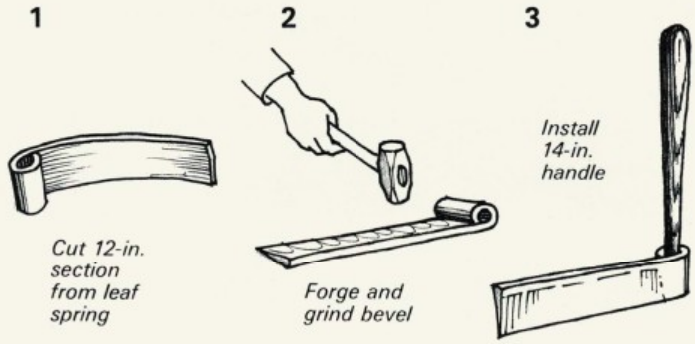
Old leaf springs are easy to find behind auto garages and in junkyards. The springs are about the right thickness and width for a froe and are excellent steel. The bottom leaf of the spring cluster has an eye on each end. This is the leaf you're looking for—the eye serves as a ready-made handle socket.

To make the froe, cut a 10-in. to 12-in. section off one end of the leaf, straighten the curve, and forge or grind in a knifelike bevel on one edge. Lacking blacksmithing tools, I cut the spring with an oxyacetylene cutting torch (an abrasive cut-off wheel would have worked as well). Then, with a helper to hold the torch, I heat the blade red hot, forge a bevel on one edge, and straighten the curve on a makeshift anvil. The bevel is completed on a grinder. Next, I harden the blade in oil and temper to light blue.

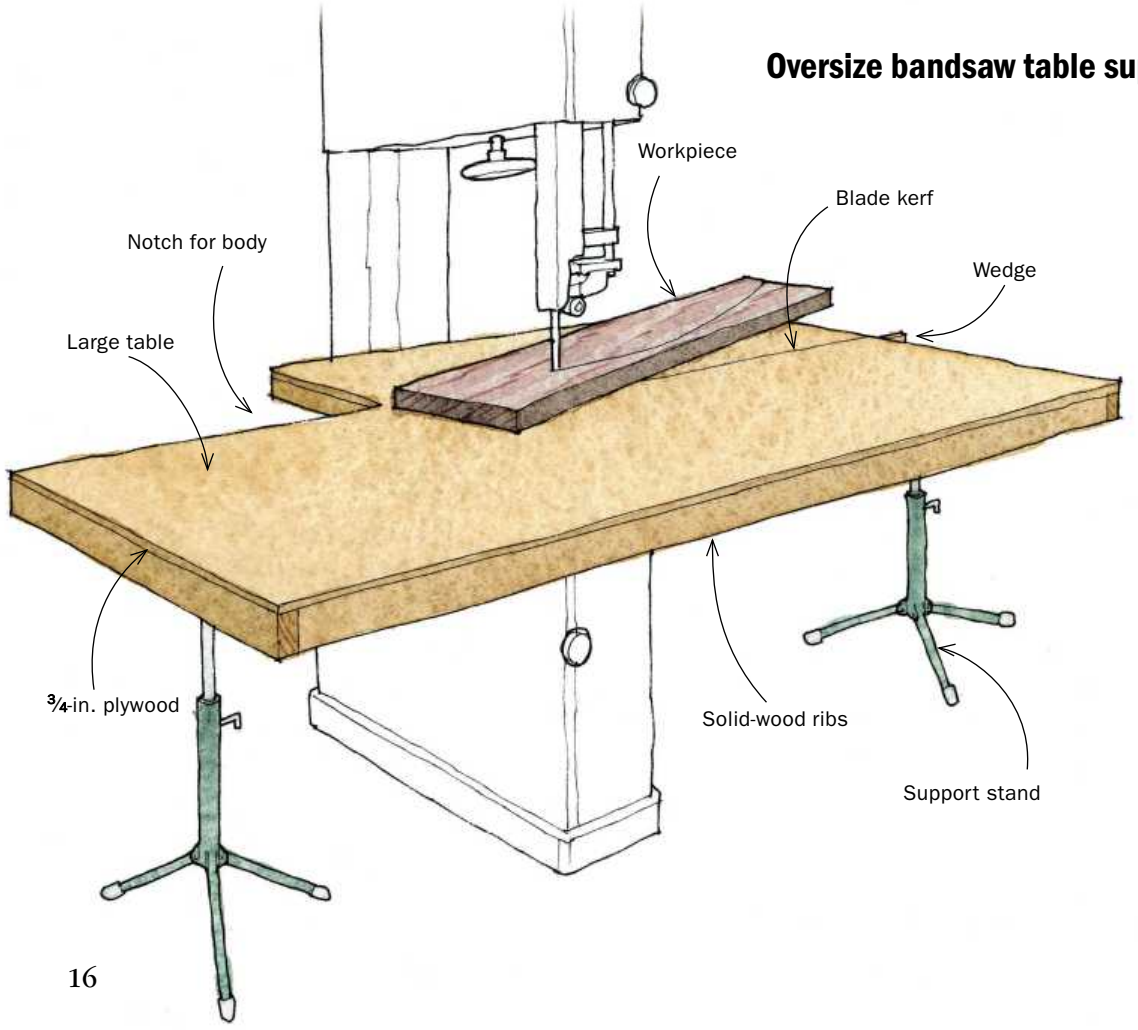
A 14-in. black locust handle driven in the handle socket completes the froe.

A more skillful blacksmith probably would have enlarged the smallish socket and bent it to be in line with the blade. These operations seemed beyond my skill and equipment. But, in using the froe, the socket size seems adequate and the offset increases splitting leverage in one direction.

—LARRY JOSEPH, Alva, Okla.



Oversize bandsaw table supports big parts and panels



When cutting long, curved furniture parts on my bandsaw, I had difficulty maneuvering them safely and accurately using my normal work stands. So I made this table extension, which measures 4 ft. wide by 7 ft. long. The notch at the front left corner provides clearance for my body. Ribs underneath add rigidity and fit around the existing bandsaw table, letting me use Quick-Grip clamps to secure it. The table is supported at each end with a work stand. Finally, I stabilize the wobbly blade kerf from under the table with a wedge and another Quick-Grip clamp. The table supports work of all sizes, making it easy to get accurate cuts.

—ED KREUSSER, Corvallis, Ore.

ACCESSORIES

Sliding table makes better crosscuts

WITH THE RELEASE OF ITS NEW SLIDING CROSSCUT TABLE, SawStop has increased the crosscutting capabilities of its industrial and professional cabinet saws, and its contractor saw, eliminating the need for shopmade crosscut sleds. We installed the crosscut table on the industrial cabinet saw in the *FWW* shop, and staff members used it over a period of several months.

The table bolts to the saw's table, so you have to remove the left extension wing. Installation is not difficult, but it does require you to cut the rip fence rails short. The sliding table has 55 in. of travel and allows crosscuts up to 48 in. deep. The fence on the table pivots like a miter gauge, with a range of plus or minus 60°.

Sliding crosscut table by SawStop

$999

Great fence, easy adjustments. *The pivoting fence on SawStop's sliding table is long, stiff, and extends from 43 in. to 58 in. A large knob on top of the fence loosens and locks in the desired angle.*

Two solid stops. *They slide smoothly in a T-track on top of the fence. They flip up out of the way when not needed, and don't deflect when you push a workpiece against them.*

It was easy to adjust—simply loosen a large knob and pivot—but it doesn't have any detents for common angles, so keep a combination square or drafting triangle handy. The fence is 43 in. long when closed and 58 in. long when fully extended, and offers solid support for workpieces. The fence has two sturdy flip stops, with a metric and imperial scale on top for setting them.

The table slides smoothly with no slop in the action. The large angle-adjustment knob on the fence provides a convenient handhold far from the blade, and it's really all you need. Operating the table with one hand is no problem. And when you don't need the table to slide, you can lock it quickly, using a knob underneath.

A common complaint, though, was that to remove the fence (to clear the way for some ripcuts, for example), you need an Allen wrench, which invariably must be tracked down. It would be more convenient if the fence could be removed or moved without a tool. But that's a small inconvenience. Overall, the sliding table is sturdy, accurate, operates wonderfully, and simplifies crosscuts. It's a tremendous improvement over shopmade crosscut sleds.

—Matt Kenney is a senior editor.

Photos, except where noted: staff

MACHINES

Quieter benchtop planer leaves snipe-free surfaces

13-in. planer by Rikon

Model 25-130H

$650

ABOUT FIVE YEARS AGO I put a segmented helical cutterhead in my school's 18-in. planer, and tearout became a thing of the past. Even the toughest woods, like tiger maple and quartersawn white oak, came out of the planer with no tearout. These great results made me want to try a segmented cutterhead in the school's second planer, a benchtop model with straight knives.

When Rikon released its new 13-in. planer, I saw my chance. The segmented head has 26 cutters arranged in six straight rows. Each cutter has two cutting edges. When the first edge gets dull, simply loosen a torx screw and then turn the cutter 90°. It took me about 20 minutes to rotate all 26 cutters—and that included reading the instructions a few times to make sure I was not missing anything.

However, there were a couple shortcomings. First, the indicator on the height gauge is positioned so far above the scale that it's hard to get an accurate reading from it. To be safe, I always ran a test piece through to dial in the height. Second, the dust collection picked up only about three-quarters of the chips. That said, overall I have been pleased with the Rikon's performance. It runs quietly, leaves very small, almost invisible mill marks, and came so well adjusted that there was almost no snipe.

—Bob Van Dyke is the founder and director of the Connecticut Valley School of Woodworking.

Big advantages over straight knives. *Rikon's segmented cutterhead is quieter and cuts cleanly. You can rotate individual cutters to get a fresh edge, and changing out all of the cutters at once is very quick.*

HAND TOOLS

Fast-cutting dovetail saw

Stiletto dovetail saw by Bad Axe

$245 and up

BAD AXE TOOL WORKS recently introduced a new saw to its lineup. Named for the fighting knife used by soldiers in the Special Forces, the Stiletto saw cuts with ease, is easy to control, and has a comfortable grip.

It has a narrow 12-in.-long blade that tapers from 1⅝ in. at the toe to 1¾ in. at the heel. The saw comes in two plate thicknesses, 0.015 in. and 0.018 in. I recently tried out the 0.018-in. version that, including set, produced a narrow overall kerf of 0.023 in.

I used it to cut all the dovetails in an eight-drawer chest and found the Stiletto to be ideal for the job. It cuts deeper and faster with each stroke than other dovetail saws I've used. And the narrow blade and low hang of the handle helped make the saw easy to control.

The saw is beautifully crafted with a nickel-plated carbon-steel back, cherry handle, gun-blued saw screws and medallion, and nicely polished spring-steel blade. In my judgment the Stiletto lives up to its name. It's a quick-cutting saw with great control.

—Chris Gochnour is a professional woodworker in Salt Lake City, Utah.

Photos, top right and center: courtesy of the manufacturer

■ MACHINES

Drill press changes speed quickly

GENERAL INTERNATIONAL'S NEW DRILL PRESS (model 75-165M1) is well-suited for woodworking. With a speed range between 280 and 2,100 rpm, the drill press can slow down for big Forstner bits and turn fast enough for small-diameter brad-point and twist bits. Speed changes are made by moving a lever, and a digital readout on the front displays the speed.

It has a 17-in. swing, and a ¾-hp motor with enough power to drive a 2-in.-dia. Forstner bit 2 in. deep in hard maple. While drilling this hole, however, I noticed some belt slippage, so I had to use a slower feed rate. It took 29 seconds to drill the hole, substantially longer than with the best drill presses in my recent review (*FWW* #249, p. 48).

The 12½-in.-square table has flat edges on all four sides, which makes it easy to clamp down workpieces and fences. The table is solid cast iron and there is no through-hole or drillable insert under the quill, so you'll need an auxiliary table over it when drilling through-holes.

There was very little runout in the quill, and a locking collar on the quill lever made it easy to set the depth stop. On the downside, the quill has only 3 in. of travel (the reason we didn't include the 75-165M1 in the head-to-head test). This means you'll need to adjust the table's height more often to accommodate bits of different lengths and workpieces of varying thickness. The task is made less difficult by an accurate laser pointer.

—Bill Peck is FWW*'s shop manager.*

Drill press by General International

Model 75-165M1

$570

■ ACCESSORIES

Resaw blades leave a smooth surface

AT SOME POINT, EVERYTHING I MAKE requires me to resaw lumber at the bandsaw. For boxes, resawing is necessary to create a four-corner match, and for wall cabinets and furniture, I resaw to create shopsawn veneers.

So I was happy to try Infinity's new rip bandsaw blades. They cut a 1/32-in.-wide kerf, which is very narrow, and leave behind a very smooth surface. I used the blade to cut several different North American hardwoods, including hard maple, and some nasty exotics, and had no trouble. The variable-pitch tooth count (alternating between 3 and 4 teeth per inch) makes it very quiet, a big deal when you're cutting shopsawn veneers for 10 to 15 minutes at a time. It's a great-performing blade, and starting at just $30 for 95-in. and 105-in. blades, a great value, too.

—M.K.

Rip bandsaw blade by Infinity

$30 each for 95-in. and 105-in. blades

Essentials of the screw joint

TIPS AND TECHNIQUES FOR USING THIS VITAL FASTENER

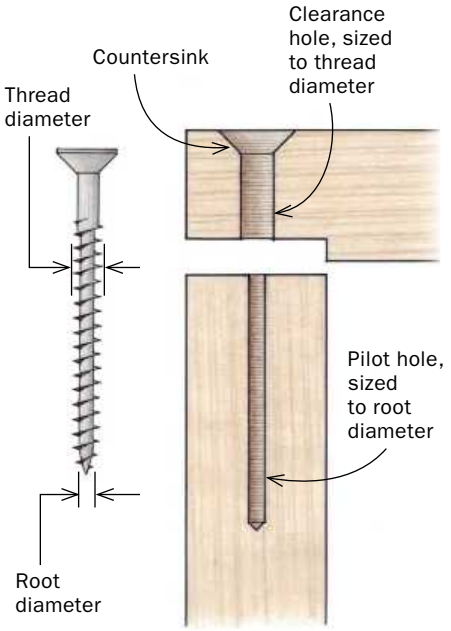
BY MARIO RODRIGUEZ

Our craft offers dozens of clever and often complex ways to join two pieces of wood. Some joints take months or years to master, and each has its advantages—strength, beauty, longevity. But none supplants the humble screw. Screws eliminate the need for time-consuming joinery, create a solid mechanical connection, and make it easy to quickly assemble and disassemble your projects.

I use screws often, even in formal pieces of furniture that include hand-cut joinery. When building a large cabinet, I'll break it down into modules and join them with screws. I also use screws to attach cabinet backs, tabletops, shelf cleats, and drawer guides. If they will be in a visible area, screws can be hidden to create a seamless look. Screws are of course also great for projects with a time or budget crunch, or where appearance isn't critical, as with jigs in the shop. If there's a chance I might have to remove, relocate, adjust, or replace a part, I attach it with screws.

Longtime contributor Mario Rodriguez teaches at the Philadelphia Furniture Workshop.

Always drill before you drive



Driving a screw may not require an advanced degree, but it does require advance preparation. For a screw to function properly when joining pieces of wood, it needs two predrilled holes: a pilot hole and a clearance hole. Together, these two holes will ensure a perfectly located screw and a tight joint, and will prevent the screw from cracking the wood.

The pilot hole, which is drilled first, goes through the upper board and into the lower one. It is drilled with a bit that is smaller than the screw's threads—it should roughly match the root diameter of the screw. This will prevent splitting and make driving the screw far easier, but still give the threads plenty of wood to grab. If the screw is going into hardwood, select a bit that's slightly larger than the screw's root; for softwoods, choose one that's slightly smaller than the root.

The clearance hole, drilled second, enlarges the pilot hole and goes through the top board only. Its function is to allow the screw to pass through the top board without the threads engaging at all. Without a clearance hole, the threads grab in the top board and keep the screw from pulling the boards tight regardless of how hard the screw is driven. The bit for the clearance hole should be slightly larger than the diameter of the threads—you should be able to push the screw easily into the hole—so the screw engages only the bottom board, pulling the joint tight as it's driven home.

To set screws flush or below the surface of the top board, drill a conical countersink (for flathead screws) or a flat-bottomed counterbore (for other screws).

THREE-STEP DRILLING PROCESS...

***Pilot hole first.** With the workpieces aligned and clamped, drill through the top board and into the bottom one with a bit sized to the root diameter of the screw.*

***Clearance hole next.** Drill into the pilot hole, using a bit just larger than the screw's thread diameter. A depth stop or gauge (in this case, tape) prevents drilling into the bottom board.*

***Countersink last.** For flathead screws, use a countersink bit to cut a conical recess for the screw head.*

***Then drive the screw.** Accurate, tight, split-free screw joints result from proper predrilling.*

...OR USE A COMBO BIT

All in one step, tapered bits with countersink collars can cut clearance and pilot holes as well as a countersink.

Photos: Jonathan Binzen; drawings: Vince Babak

Beyond the basics

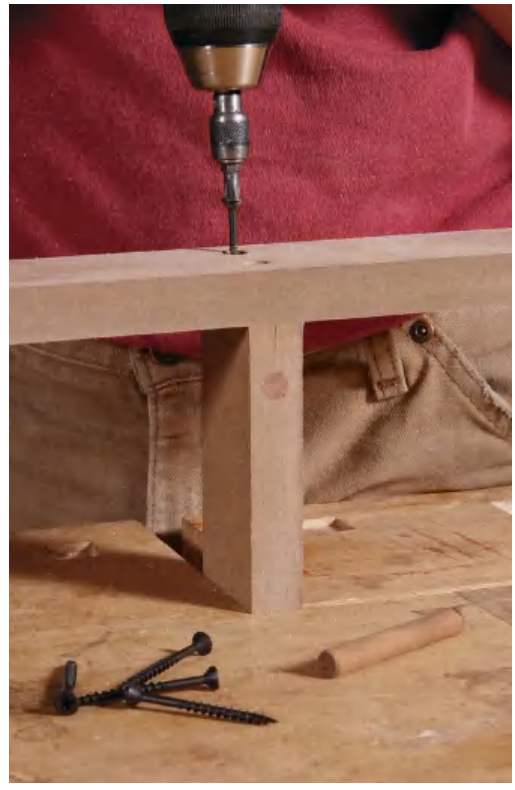
PLUGS MAKE SCREWS PRESENTABLE

To hide your screws, start by cutting a counterbore—a flat-bottomed hole—to recess the screw head. Use a brad-point bit (near right) in the drill press to cut a clean hole to accurate depth. To fill the counterbores, produce precise cylindrical plugs using a plug cutter (center) at the drill press. Cut a number of plugs and then saw them free on the bandsaw. After driving the screws, glue in the plugs and cut them flush with a chisel (far right), then smooth them with a plane or sandpaper.

SCREWS THAT ALLOW WOOD MOVEMENT

When you need to accommodate substantial wood movement, you can create an elongated clearance hole and counterbore. Then the screw can travel in the slot without loosening its grip. First rout the clearance slot, controlling the cut with a fence clamped to the plunge router. Then, with the fence at the same setting, change to a larger, flat-bottomed router bit to cut the wider slot for the screw head.

ADD BITE FOR END-GRAIN SCREWING



Screws don't grip well when you are screwing into the end grain of a piece of wood, or into the edge of a piece of MDF or plywood. To solve the problem, insert a dowel in the lower board and drive the screws through it.

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	2. Mailed in-county paid subscriptions:	0	0
	3. Paid distribution outside the mails:	26,297	29,368
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C.	Total paid circulation:	158,626	158,378
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Driving lessons

Wax works. *Rub a little paste wax or paraffin on the threads to coax a screw into place more easily.*

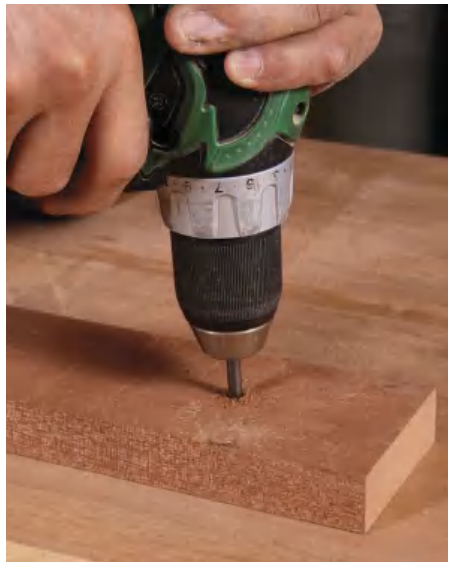
Steel for strength, brass for beauty. *Brass screws are prone to breaking, especially in hardwoods, and it's easy to strip their heads. So when mounting brass hardware, use steel screws first, then replace them with a set of brass screws of the same size.*

TIP A fix for stripped holes

If you have a hole that's stripped, or too large for your screw, fill some of the space with glue-coated slivers of wood. Cut off the excess, wait for the glue to set, and then reinsert the screw.

WHAT ABOUT A BROKEN SCREW?

Oops. *To remove a screw that's broken off at or below the surface of the workpiece, Rodriguez uses a relatively new screw-extractor kit called Unscrew-Ums (from T & L Tools; tltools.com, 860-464-9485).*



Simple extraction. *With one of the extractor sleeves in the chuck and his drill in reverse, Rodriguez carefully drills down over the screw (left). The extractor cuts down, tightening around the screw and eventually backing it out of the hole (above).*

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Taunton

Freestanding dream shop

BEAUTIFULLY TAILORED FOR WORKING WOOD, IT CAN EASILY CONVERT TO A TWO-CAR GARAGE DOWN THE ROAD

BY ELIA BIZZARRI

My first shop was under the hickory tree in my parents' yard. My bench was a picnic table. I made a woodpecker door-knocker and a rabbit trap, but I caught no rabbits. My parents bought me my second shop when I was 16. A 10-ft. by 20-ft. prefab structure, it was mostly plywood and 2x4s, with a small window at one end and double doors at the other. It was plenty big enough for a chairmaker, and it served me well for 10 years or so. When I bought my own home four years ago outside Durham, N.C., I knew I'd be building a freestanding shop. In the meantime, the 10-ft. by 12-ft. spare bedroom became my workshop. I worked full time in that room for two years and, except for wood chips in the bed, it worked fine. But it wasn't my dream shop.

Two pieces of advice started me on my way to designing that dream shop. One came from my realtor and friend, Louise Barnum, who said, "I know you think you'll never sell your place, but if you do, a garage would make it easier to sell than a shop." The other came from Louise's husband, Peter Ross, who was the head blacksmith at Colonial Williamsburg for more than 25 years, and is the most observant, consummate craftsman I know. He told me, "If your shop isn't the nicest building on the property, you'll never want to go there."

Converts easily to a garage

Louise is right—I have no intention of selling. But, at 31, I'm not married, and I suppose a woman might conceivably convince me to move. With that possibility in mind, I decided

Photos: Jonathan Binzen

to build the shop so it could become a two-car garage. That decision determined the footprint of the building. At 20 ft. by 28 ft., it is larger than I really need as a chairmaker, but the extra space is useful when I have a handful of students at the same time (and when I have my swing-dancing friends over). The potential conversion also led me to frame the front wall as if it would get two garage doors. I put double doors in one opening, but in the other I installed a triple-sash window. The window and the framing around it as well as the section of the foundation below it could all be removed without too much fuss to create an opening for a second garage door.

A floor fit for cars and kind to calves

For the shop to convert to a garage, I needed a floor that was strong enough to drive a car on, yet made of wood for my comfort. My architect wanted to pour a concrete slab, put 2x4 sleepers on the slab, and put decking on the sleepers. This conformed with normal building practice, but seemed overkill to me. I considered a floor like the one in Peter Ross's blacksmith shop, which has 4x4 blocks of locust, 4 in. long, laid end grain up like bricks in a bed of sand. Many 19th-century industrial buildings had floors like this. The railroad museum near Atlanta has acres of old 4x6 pine blocks on the repair shed floors around its turntable. It is a gorgeous sight.

But I calculated I would need 2,500 board feet of lumber cut into 6,000 pieces to cover my downstairs floor with blocks. Even if I got offcuts from a pallet mill, this was going to be a lot of work. Peter Ross suggested an alternative: a base of packed gravel, then a vapor barrier, then 4x4 pressure-treated sleepers followed by decking. The building inspections department had never heard of such a thing, but gave the go-ahead since the floor floated inside the masonry walls and was not considered structural. I could make it as I chose, regardless of how crazy they considered it to be.

A local mill sawed 1,600 board feet of oak 2x6s for 50 cents per board foot. In hindsight, I should have gotten 2x8s. Wider boards mean fewer joints, and less wood and work lost in making them. I got a mix of red and white oak, though I would have preferred just the rot-resistant white. After attempting to air-dry the oak over the wettest summer in human history, I sent it to a kiln to speed things up. Then two helpers and I spent a couple of days with a big planer and two shapers to mill the oak into tongue-and-groove flooring. Though the floor was never sanded, it milled so perfectly that when we unloaded my 600-lb. lathe and slid it across the floor, it didn't catch on a single board.

What for walls?

Aesthetically, my favorite building style is the timber frame. But after coming across a tempting disassembled 1820s timber-frame barn, I considered the amount of work involved in building with it and decided I'd rather put that energy into furniture. I chose instead to go with stick framing, which is very efficient with materials and fast to build.

For efficiency, tools need to hang on the wall near where they are most frequently used. But when I worked in my spare bedroom, the drywall foiled all but my most determined tool-hanging attempts. Plywood works fine for shop walls, but it's ugly. Painted plywood beadboard would look pretty good, and, if thick enough, would support hanging tools. But at a nearby mill I found shiplapped white pine paneling for around 60 cents a square foot. This turned out to be ideal: it went up extremely quickly, looks beautiful unfinished, and you don't need a college education to hang a tool on the wall.

Double doors with a fiery finish

I loved building the big double doors, and they have proved unexpectedly attractive and useful. I can drive right into the shop to unload heavy things, roll a cart out into natural light for applying finish, and here in North Carolina, I can leave the doors open most of the year to increase airflow and light.

Based on doors at Mount Vernon, they are made of two layers of ¾-in. shiplapped boards, the inside layer running vertically and the outside layer running at a 45° angle. I screwed them together using nearly 5 lb. of screws. I cut through the outside layer with a circular saw to create a rabbet for a frame of 4/4 boards around the periphery. I also inserted 4/4 boards for the strap hinges. The 4/4 boards probably aren't necessary, but they sure make a nice-looking door, and they should help protect the end grain of the diagonal shiplapped boards.

The best part of building the doors was installing the pintle hinges. They're composed of two parts: the long strap, which attaches to the door, and the pintle, which attaches to the building. The pintle is basically a huge tapered nail, with a pivot for the strap on one end and a slot on the other end that accepts a wedge that keeps the pintle from pulling out of the wall. During framing I put extra 2x6s around the doorway, since the pintles need to go through solid wood. When it came time to hang the doors, I bored a pilot hole through the wall, then heated the pintle in a fire and used it to burn the hole to shape. Locking pliers help to steer the pintle, and a sledgehammer motivates it. If the pintle is hot enough, flames shoot out of the hole. Very exciting!

You need general lighting, but raking light shows every dent, tool mark, and scratch.

Let there be light, and lots of it

In my opinion, the single most important feature of a shop is the most overlooked: light. The light in your shop should be as good as any light your work will be seen by once it leaves the shop. You need general lighting, but light coming directly from above tells you nothing about the surface of your work. Raking light, by contrast, shows every dent, tool mark, and scratch. Sometimes raking light is all you need, sometimes you want both. But you always need some raking light.

Natural light is best. I put 8-ft. windows on the north and east walls, and I placed my bench beneath them. In wintertime, from 8 a.m. to 4 p.m., sunlight is all I need. Leaves pose a problem come summer, so I occasionally resort to incandescent lighting. I'm trying to clear more trees, but sometimes it seems the entire forest needs to go—not an appealing prospect.

Fluorescent tube lights work well for general lighting, but I've never liked the color of light they produce. So for general lighting, following the example of my mentor, Curtis Buchanan, I put track lights on the ceiling. With ten 65-watt bulbs and a mix of spots and floods shining on my bench, I get passable lighting. But my ceilings are 10 ft. high, so I don't get good raking light from the tracks, and I could use more general light at night. It may be time to reconsider fluorescents.

I recently mounted a common swing-arm desk lamp on the wall behind my bench. I can instantly adjust the light source where I need it, and then it folds away. It cost a whopping $20.

When it comes to finishing, I rarely use my bench, since a workpiece placed there is back-lit by the windows, a blinding situation. Instead, I use a finishing cart, which I can move around inside or out to get the best light.

Well-placed windows. *Large windows over the workbenches provide excellent natural light for handwork.*

A few good machines. *Much of Bizzarri's work is done with hand tools, but that hasn't kept him from acquiring some heavy-duty old machines, including a bandsaw, lathe, and planer.*

Chair shop. *Bizzarri specializes in building traditional Windsor designs, like this one developed by his mentor, Curtis Buchanan. Bizzarri also makes hand tools and sells chairmaking supplies.*

A place to build … community

Working in a clean, uncluttered space increases my efficiency and enjoyment, but it also creates a welcoming environment. My shop has turned into a gathering spot, a place to have parties, concerts, and dances.

The place is intensely personal—built with my hands, it is a space in which I work, sweat, cuss, and laugh. In our modern society, work is most often separated from play. The act of making a living is isolated from the joys of family, friends, and neighbors. Where thousands of Facebook friends can become meaningless in their ubiquity, people seem to yearn for personal connection. Maybe my shop is a window to a world where that connection was part of daily life. □

Elia Bizzarri's shop is in Hillsborough, N.C. (handtoolwoodworking.com).

Shaker Workbench

With a stout base, thick top, and abundant tool storage, this is one bench you'll never outgrow

BY MICHAEL PEKOVICH AND MATT KENNEY

The shop at *Fine Woodworking* gets a lot of use and a fair amount of abuse. This is especially true of the workbench. After years of steady and heavy use, the top and vises are just hanging on, and the tool cabinet in the base is barely functional. The time for a new bench has come.

You might think that a bench for a communal shop would need to be quite different from a bench used in a one-man shop. But the basic requirements are the same. It should have a thick, flat top that sits on a stout, rigid base, and it should offer plenty of options for holding work. The bench we designed has it all. Inspired by the one used in the workshop at Hancock Shaker Village in Pittsfield, Mass., the bench has a big, heavy base with drawers for all of your hand tools, and a beefy hard-maple top.

For holding work, we put a twin-screw vise on the front, with enough space between the screws to dovetail most furniture parts. We added a sliding board jack to support boards for edge planing, or for when you need to dovetail a part that's too big to fit in the vise. For planing work on the benchtop, we prefer using stops tailored for the job at hand. That's why there is no end vise. The top can also be drilled for holdfasts.

In general, benches are not complicated beasts. The most challenging part of building this one is handling the big parts as you cut joinery in them. By the way, even though two of us built the bench together, it's certainly possible for just one woodworker to get the job done.

Begin with the base

There are two parts to the base: a stout frame and a cabinet with drawers. Construction begins with the frame, which is made of 8/4 cherry. The mortise-and-tenon joints connecting the legs to the rails and stretchers are drawbored, eliminating the need to clamp the base together as the glue dries. The back and sides of the frame are grooved to accept shiplapped panels, which are made of white pine and finished with blue milk paint.

After gluing up the blanks for the legs and the three stretchers, mill all of the frame parts to their final dimensions, then lay out the mortises, including the holes for the drawbore pegs. Drill those holes at the drill press before mortising.

We cut the mortises with a hollow-chisel mortiser. We used a ½-in. bit to cut the ½-in.-wide mortises in the short side rails. However, for the 1-in.-wide mortises in the stretchers, we used a ⅜-in. bit and cut

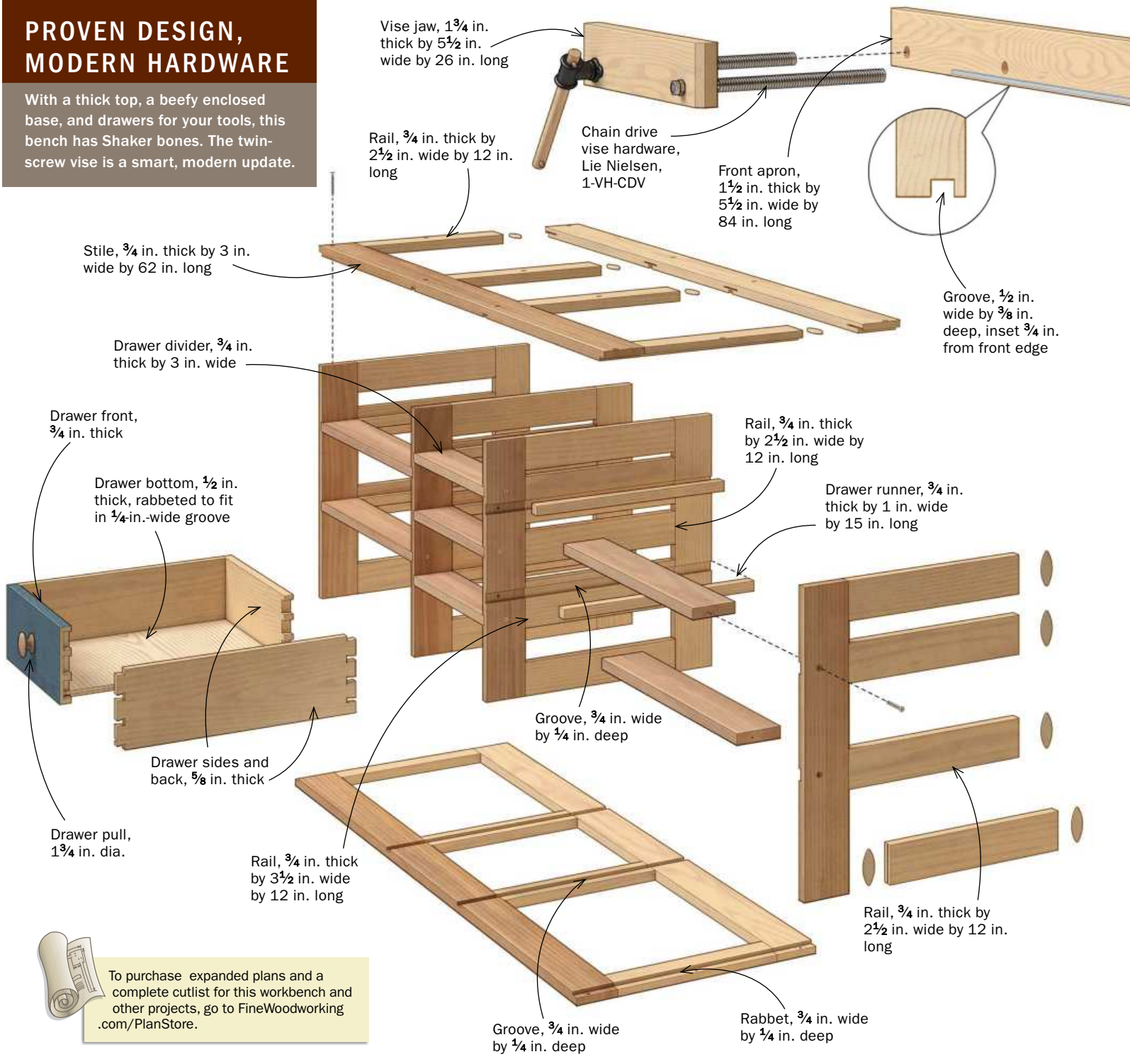
Photos: staff

VIDEO WORKSHOP

Watch Pekovich and Kenney build this workbench from start to finish in a members-only video.

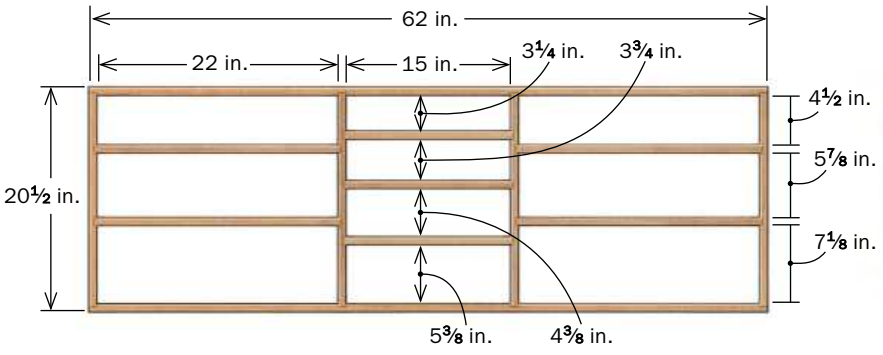
PROVEN DESIGN, MODERN HARDWARE

With a thick top, a beefy enclosed base, and drawers for your tools, this bench has Shaker bones. The twin-screw vise is a smart, modern update.

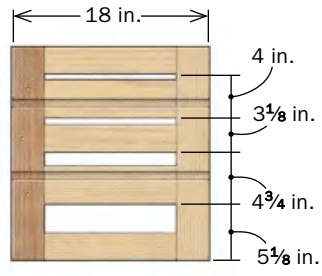


To purchase expanded plans and a complete cutlist for this workbench and other projects, go to FineWoodworking.com/PlanStore.

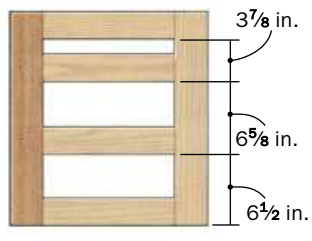
DRAWER BOX



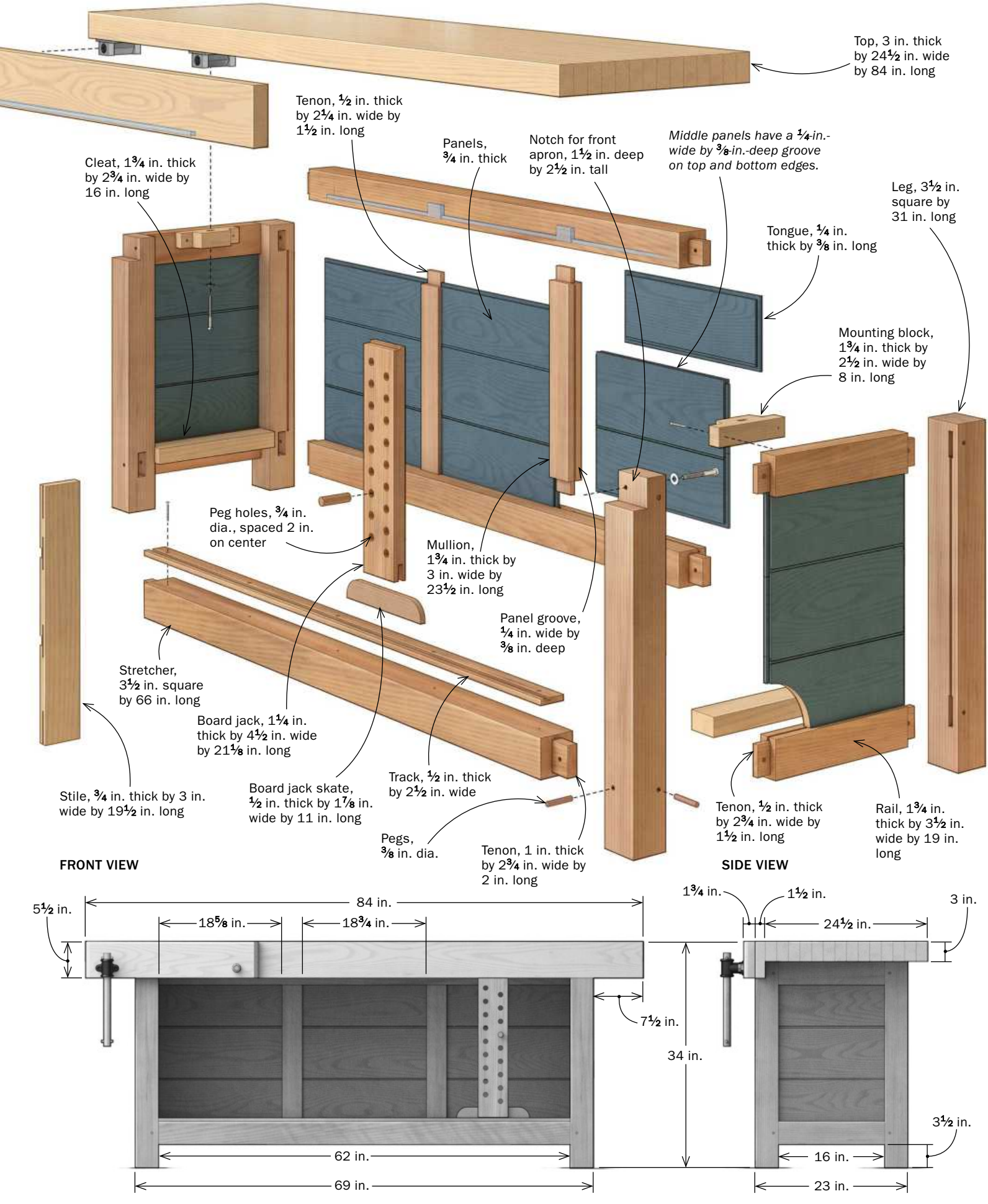
MIDDLE WEB FRAME



SIDE WEB FRAME

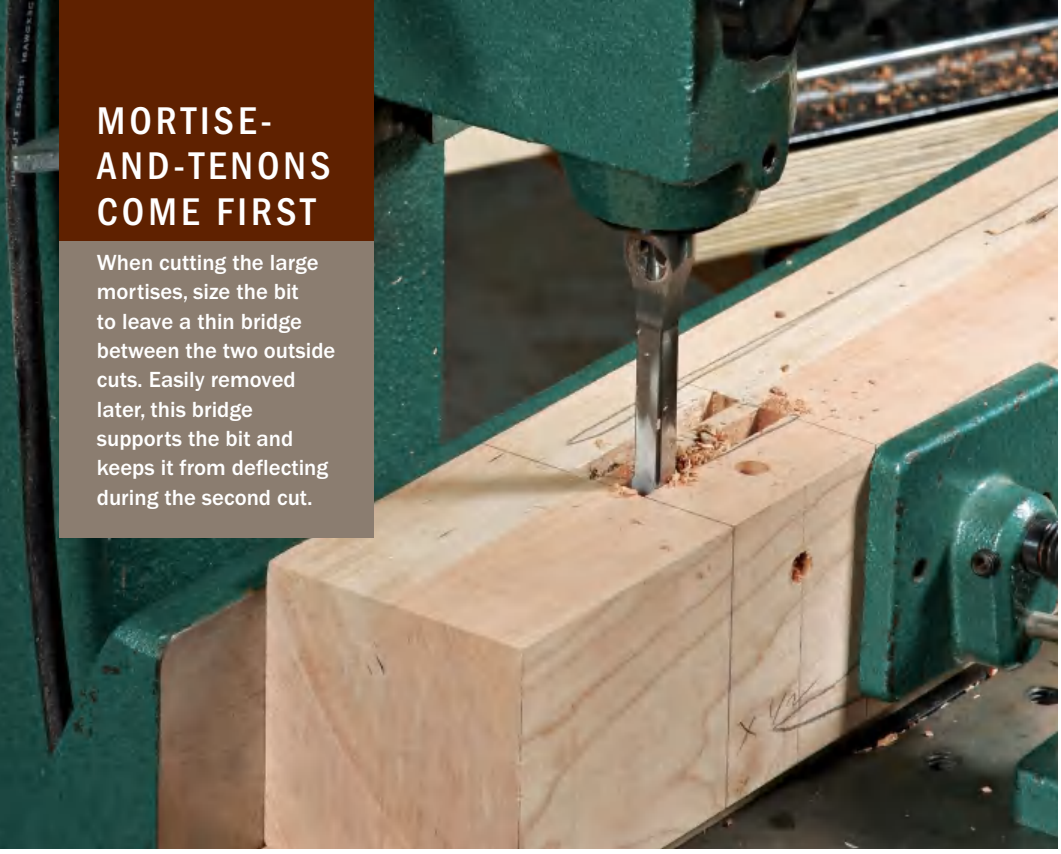


Drawings: John Hartman


Top, 3 in. thick by 24½ in. wide by 84 in. long
Tenon, ½ in. thick by 2¼ in. wide by 1½ in. long
Panels, ¾ in. thick
Notch for front apron, 1½ in. deep by 2½ in. tall
Middle panels have a ¼-in.-wide by ⅜-in.-deep groove on top and bottom edges.
Cleat, 1¾ in. thick by 2¾ in. wide by 16 in. long
Leg, 3½ in. square by 31 in. long
Tongue, ¼ in. thick by ⅜ in. long
Mounting block, 1¾ in. thick by 2½ in. wide by 8 in. long
Peg holes, ¾ in. dia., spaced 2 in. on center
Mullion, 1¾ in. thick by 3 in. wide by 23½ in. long
Panel groove, ¼ in. wide by ⅜ in. deep
Stretcher, 3½ in. square by 66 in. long
Board jack, 1¼ in. thick by 4½ in. wide by 21⅛ in. long
Stile, ¾ in. thick by 3 in. wide by 19½ in. long
Board jack skate, ½ in. thick by 1⅞ in. wide by 11 in. long
Track, ½ in. thick by 2½ in. wide
Pegs, ⅜ in. dia.
Tenon, 1 in. thick by 2¾ in. wide by 2 in. long
Tenon, ½ in. thick by 2¾ in. wide by 1½ in. long
Rail, 1¾ in. thick by 3½ in. wide by 19 in. long
FRONT VIEW
SIDE VIEW
5½ in.
84 in.
18⅝ in.
18¾ in.
7½ in.
34 in.
62 in.
69 in.
1¾ in.
1½ in.
3 in.
24½ in.
3½ in.
16 in.
23 in.

MORTISE-AND-TENONS COME FIRST

When cutting the large mortises, size the bit to leave a thin bridge between the two outside cuts. Easily removed later, this bridge supports the bit and keeps it from deflecting during the second cut.



Outside walls first. *After cutting along the first wall, rotate the leg so that the opposite face is against the fence, then cut along the second edge (top). To remove the waste between cuts, insert a spacer between the fence and the workpiece (above), and remove the bridge in the center (right).*

them in two passes. Cut one side of the mortise, flip the board around (the mortise is centered on the leg), and cut the other side. To remove the ¼-in. bridge of waste in the middle, just plunge the bit into the waste, working from one end to the other.

Before moving on to the tenons, cut notches in the top of the front legs for the apron. These notches allow the apron to be flush with the front of the legs, giving you more bearing surface when clamping in the vise. (Don't worry about the apron interfering with the top front stretcher—there is none.) We cut the shoulder of the notch at the tablesaw, and the cheek at the bandsaw, cleaning up the surfaces with a handplane. Drill a clearance hole in the notch for the lag screw that you will use later to secure the apron to the base.

Cut the tenons on the rails of the end assemblies at the tablesaw, using a miter gauge and dado set. The stretchers are too long for the tenons to be cut the same way. For these, the best approach is to cut the shoulders at the tablesaw and the cheeks at the bandsaw. Leave the tenon just a bit thick, and trim it to fit.

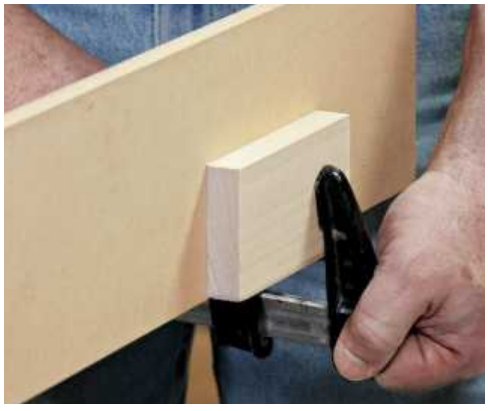
Next, mark the tenons for drawboring. To learn how this is done, take a look at

Two tools for stretcher tenons. *Cut the shoulders at the tablesaw first. On the bandsaw, set the fence for the first cheek, cut it, then flip the stretcher to cut the second cheek.*

CUT GROOVES FOR BACK AND SIDE PANELS

The frame of the base forms a nearly indestructible foundation for woodworking, and it also holds the panels that turn the base into a cabinet.

Through-grooves are straightforward. *Add an auxiliary face to the rip fence. Rip the groove in line with the tenon.*



Stopped grooves need stop blocks. *Clamp a block to the auxiliary fence (above). Place the trailing end of the leg against the stop, then carefully lower the leg onto the spinning dado set (right). Screwed to the outfeed table, a piece of MDF terminates the cut (below right). Turn off the saw before removing the leg.*

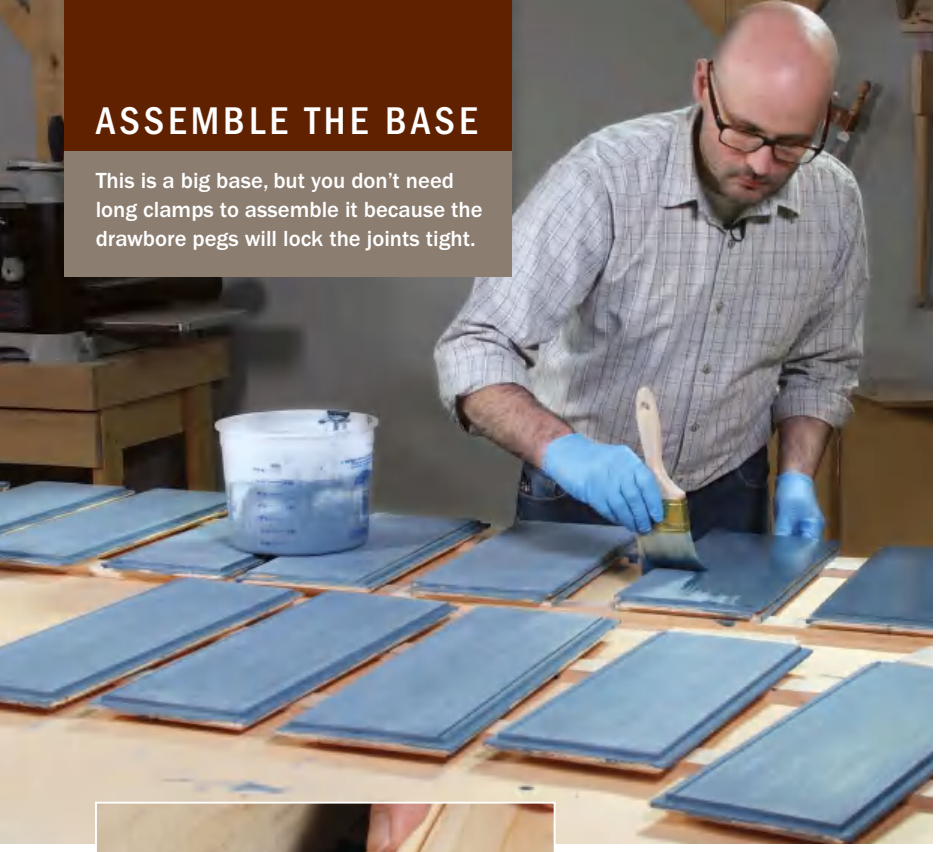
Steve Latta's article "Drawbore Your Tenons," *FWW* #241, p. 38.

With the mortise-and-tenon joinery complete, turn to the grooves for the panels. On the stretchers and rails, these are through-grooves, but on the legs they are stopped. Still, you can cut them all at the tablesaw with a dado set. The through-grooves are no problem, but use stop blocks to help start and stop the cut for the stopped grooves (see photos, above).

For the tongue-and-groove panels, begin by cutting the boards to their final dimensions. Cut all of the ¼-in.-wide grooves with a dado set, then cut the tongues. The tongues are centered on the boards, and the same dado and fence setup is used to

ASSEMBLE THE BASE

This is a big base, but you don't need long clamps to assemble it because the drawbore pegs will lock the joints tight.



Two coats of paint. *Because it's mixed with water, milk paint raises the grain, so sand with 320-grit paper after each coat.*

Assemble the ends first. *Add the rails to one of the legs, then slide the panels in place. The second leg completes the assembly.*

Bead the top and bottom panels. *On the top panel, the bottom edge gets the bead. On the bottom panel, the top edge gets beaded.*

Drawbore the joints. *Use straight-grained white oak for the pegs. The drawboring action eliminates the need for clamps. The pegs are trimmed flush later.*

cut the tongues that fit into the grooves in the base frame. To cut the small bead on the groove side of the joints, we used a router bit. Paint all the panels before assembly. Two coats should do the job (sand between coats with 320-grit paper).

The last thing to do before assembling the base is to make the pegs. We used white oak and made the pegs with a dowel plate. If you don't have a dowel plate, just buy white oak dowel stock at a woodworking-supply store, and cut it to length.

With pegs made, you're ready to assemble the base. Begin with the ends. Glue two rails into one leg, then slide the panels into the grooves (no glue). Spread glue on the two remaining joints and add the second leg. Finally, drive in the drawbore pegs for all four joints.

After the two end assemblies are together, glue and drawbore the three stretchers to one of the end assemblies. Slide the back panels in place. Finally, glue and drawbore the stretchers to the other end assembly.

Glue up the top and add the vise

The next job is the top. It's not hard to make, but it does require some serious muscle. The best way to tackle the top is to glue it up in sections that are narrow enough to run across your jointer and through the planer after the glue has dried. After you have milled the sections to their final thickness, glue them together.

While the top dries, cut the apron to size. Then use the drill press to drill holes in it for the vise. Next, rout the groove for the sliding board jack on the bottom edge of the apron using a spiral upcut bit. To prevent the router from wandering, we attached two edge guides to it, one on each side of the apron. With that

Some help required. *After putting the front stretcher and assembled back into one of the ends, lower the second end into place. It's heavy, so ask a friend for help.*

done, glue the apron to the top and install the vise.

There are two more things to do before you put the top on the base. Glue the mounting blocks to the top rails of the end assemblies. These are drilled with a clearance hole and counterbore for the lag screws that attach the top. Also, attach the drawer-box cleats.

Build the drawer cabinet

We could have built the structure for the drawers into the base, but that approach is unnecessarily complicated. Instead, we built a frame "box" to create the drawer pockets and then slid that into the base.

The frame is constructed from two horizontal and four vertical web frames. The two middle frames fit into dadoes cut into the horizontal dividers. The two end frames fit into rabbets.

This drawer box will not shoulder any significant weight, so you don't need mortise-and-tenon joints to hold it together. We used biscuits and screws. After the frames have been assembled, cut the grooves and rabbets in the top and bottom frames to accept the vertical frames. Use the same dado setup to cut the drawer-runner grooves in the vertical frames.

Assemble the drawer box with screws and then slide it into the bench base. Screw the bottom frame to the lower stretchers.

Now make and install the dividers and runners/kickers. The dividers are screwed into the frame, but the runners/kickers are glued in place.

Attach the apron with the top in place. *Resting the apron on the notches in the legs keeps it level, and makes it easier to get the first few clamps on. You'll need a lot of clamps. Plane it flush after the glue dries.*

BUILD AND INSTALL THE DRAWER BOX

Because the base is enclosed, there is no need to make a heavy solid wood or plywood cabinet for the drawers. A skeletal box made from six frames held together by biscuits and screws is all you need.

Screw the frame together. *The frame is screwed to, and reinforced by, the bench's base. After cutting the grooves for the drawer runners in the vertical frames, screw them to the horizontal frames.*

Add the dividers. *These slide in from the front (right), and are held in place by screws driven through the vertical dividers. Then glue the runners in place (far right). They also serve as kickers for the drawers beneath them.*

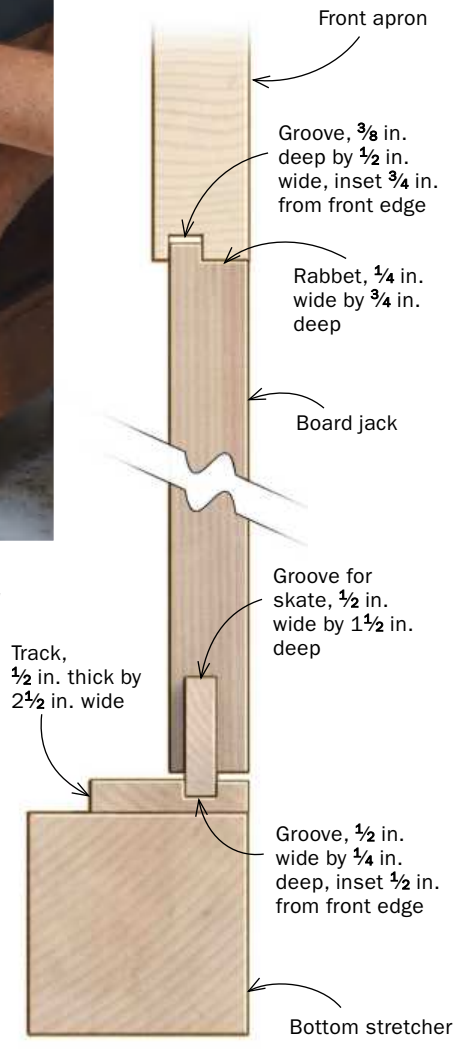
Slide the box in. *Screw it to the lower stretchers and cleats attached to the lower rails.*

BOARD JACK IS A HELPING HAND

Panels too wide to fit between the screws of the vise, or boards so long that they are more outside than inside the jaws, need extra support to keep them steady. This board jack is the perfect assistant.

Board jack rides in a track. *After cutting the groove in the track, screw it to the bottom stretcher.*

Big foot prevents racking. *The long skate at the bottom of the jack allows it to slide more smoothly. Attach it with screws.*



With the drawer box complete, you can make and install the drawers. After that, it's time for the board jack. The bottom edge of the apron is already grooved for it. Make and install the grooved track that sits on the bottom stretcher. The jack has two parts. There's a vertical piece with two rows of holes. It's rabbeted on top to fit into the apron's groove and notched on the bottom to take the second part of the jack: a skate that fits into the track.

You're almost done. Use a straightedge and winding sticks to check if the top is flat. If it's not, plane it flat. Finally, apply a penetrating oil finish to the bench, including the milk-painted surfaces. After the oil dries, get to work on your next piece of furniture, and have some fun. □

Michael Pekovich is executive art director and Matt Kenney is senior editor. Both are seasoned furniture makers and woodworking instructors.

TOOL TEST

Cabinet Saws for the Home Shop

Compact models give you the power and accuracy of a full-size saw for less

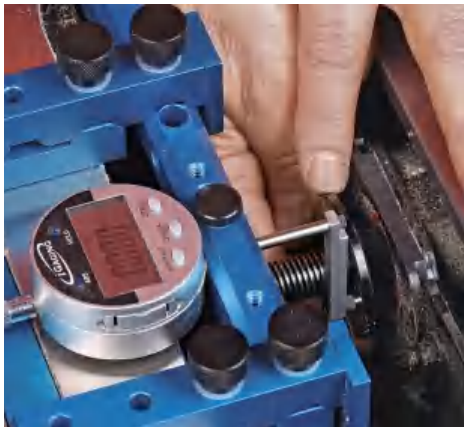
BY ROLAND JOHNSON

Article Extra
Listen in on a Shop Talk Live podcast where the author talks about the most important features to look for in a new saw.

It would be nice to have a full-size cabinet saw in your home shop. But there are roadblocks to purchasing one. Because they can cost more than $3,000, it can be difficult to fit one in your tool budget. They also require a 240-volt circuit, which many of us don't have in our garage and basement shops. Finally, they can take up a lot of space.

Not too long ago, the only alternative to a full-size cabinet saw was a contractor saw, but they are fussy to adjust, have poor dust collection, and can be underpowered for furniture making. Now there's a new style of saw that will fit the bill for most home shops. These compact saws give you all of the benefits of a cabinet saw—power, good dust collection, vibration-dampening mass, and easy adjustments—for less money. And they all can run on a 110-volt circuit.

Fine Woodworking asked me to compare these saws head to head. I checked them for accuracy, including arbor flange runout, and whether the blade was parallel to the miter slot. I also looked at the sturdiness and accuracy of the rip fence, the saw's ability to hold settings for tilt and elevation, power switch placement, and the ease of changing blades. To gauge their



No problem with runout. *Johnson checked every saw for runout at the arbor flange (where it really matters) and found that none of the saws had any.*

Parallelism at 45° and 90° was impressive, too. *With the blade at each angle, most of the saws were close enough to parallel that cuts were not affected.*

Plenty of muscle for furniture making. *None of the saws had trouble ripping 8/4 hard maple, and all have enough power to cut just about anything you'd need to make furniture.*

power, I ripped 8/4 hard maple and timed each rip. I repeated the process numerous times for each saw, using both a standard-kerf and a thin-kerf blade.

After the tests, it was clear that the Sawstop PCS175 was the Best Overall. It was dead accurate, has a top-quality fit and finish, is the most user-friendly saw, and has SawStop's flesh-sensing technology and blade brake. The Best Value among the saws is the Grizzly G0715P. It's heavy, accurate, has good power, and costs just $825.

Roland Johnson is a contributing editor.

Safety features that are easy to use. *The biggest recent improvement in tablesaws is the quality and convenience of the riving knife and blade guards that come with them. All of the saws have good knives and guards.*

Photos: Matt Kenney (top two and opposite page), John Tetreault (center), Roland Johnson (bottom)

"It's excellent. Throw in its safety device, and it's tremendous."

SAWSTOP PCS175

Price: $2,299

Motor: 1¾ hp, 110v

Table size: 27 in. by 44 in.

Rip capacity: 30 in.

Arbor-flange runout: 0.000 in.

Blade-to-slot parallelism at 0°: 0.000 in.
at 45°: 0.001 in.

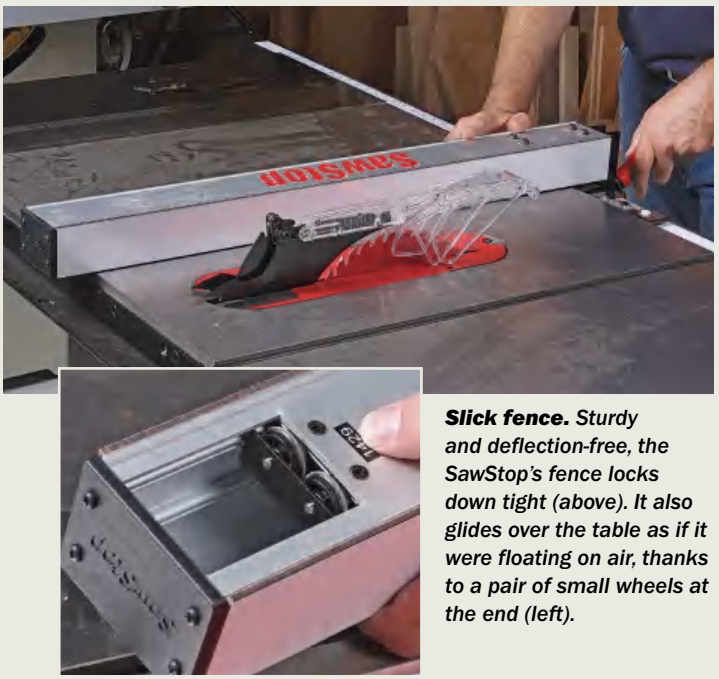
Warranty: 2 years

AUTHOR'S BEST OVERALL CHOICE

Even without its well-known blade brake, the SawStop is a great saw. It has very good ripping power. The dust collection was good, especially considering that the blade is enclosed only on one side to make room for the blade-brake cartridge. A 4-in. hose connects the blade shroud to a port in the cabinet. Everything else about the PCS175 is smooth. The fence locked tightly and glided like skates on ice, at least in part due to two small wheels on the underside of the fence at the end opposite the handle. You can move the fence with one finger. The tilt and elevation wheels had no backlash, and turned beautifully.

Switching from the riving knife to the blade guard took no time at all. And the guard is very good. There are three independent, but connected, leaves on each side of the blade. Their light weight made it easy to push thin or light stock under the guard, and the leaves fall sequentially back into position. There is no locking device for holding the leaves off the table, but it was easy to lift the leaves manually above the fence for ripping narrow stock. When making a replacement insert plate, you have to do some extra work to make way for the safety gear, a small inconvenience that doesn't outweigh the safety aspect. Overall, the SawStop PCS175 is excellent. Throw in its safety device, and it's tremendous.

Quick exchange from riving knife to guard. *A big, easy-to-reach lever is all you need to free them on the SawStop.*



Slick fence. *Sturdy and deflection-free, the SawStop's fence locks down tight (above). It also glides over the table as if it were floating on air, thanks to a pair of small wheels at the end (left).*

Photos, except where noted: Kelly J. Dunton

"You get a lot of saw for well under $1,000."

GRIZZLY G0715P

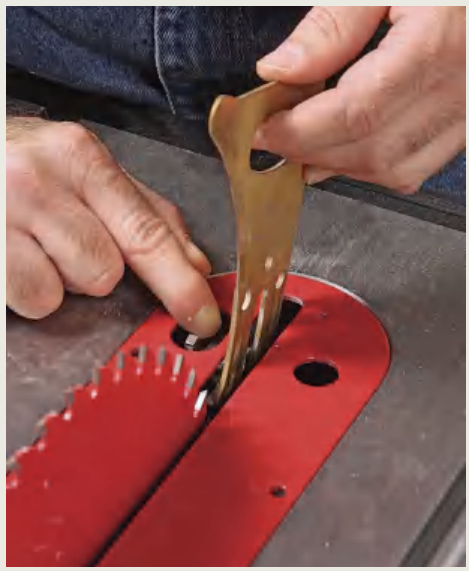
Price: $825
Motor: 2 hp, 220v
Table size: 27 in. by 40 in.
Rip capacity: 30 in.
Arbor-flange runout: 0.000 in.
Blade-to-slot parallelism at 0°: 0.009 in.
at 45°: 0.004 in.
Warranty: 1 year

AUTHOR'S BEST VALUE CHOICE

With the Grizzly you get a lot of saw for well under $1,000. Powered by a 2-hp motor, the G0715P has plenty of muscle and did very well in the ripping test. (It comes wired for 220 volts, but can be rewired for 110.) The T-square style fence is stout and locked down square with no deflection. Even though there is no blade shroud, dust collection was still quite good, and a big hinged door over the motor makes it easy to vacuum out any dust that falls to the bottom of the cabinet.

The release mechanism for the riving knife and blade guard was easily the most convenient in the test. You don't have to remove the throat plate to switch between the knife and guard. Just slide a thumbwheel back and to the side, and the riving knife is released. Slide in the guard, push the thumbwheel to the side and forward, and it locks the knife into place. Wonderful! The blade guard is good, with a leaf on each side of the blade. The leaves pivot up as wood is fed under them, and rise independently so that you can raise just one for thin rips. The arbor lock worked well and was easy to access, making single-wrench blade changes convenient. A minor downside is that the throat plate is very thin, which complicates making a zero-clearance insert for it.

Power switch is hard to miss. *The Grizzly's switch is easy to find while you keep your eyes on the blade and workpiece, making for safer transitions at the start and end of a cut.*



Awesome riving knife removal. *There's no need to remove the throat plate, and all you have to do is move a small thumbwheel to free the knife or guard.*

Guard works for thin rips. *One side can be rotated up above the fence, while the other side stays down to cover the blade.*

"The only fence in the test that comes with a digital readout."

BAILEIGH TS-1044H

Price: $1,595
Motor: 1¾ hp, 110v
Table size: 27 in. by 44 in.
Rip capacity: 36 in.
Arbor-flange runout: 0.000 in.
Blade-to-slot parallelism at 0°: 0.006 in.
at 45°: 0.026 in.
Warranty: 1 year

Cabinet saws are heavy and difficult to move by yourself, which is something you might need to do in a home shop that doubles as a garage. Baileigh addressed the problem by mounting four wheels inside the TS-1044H's cabinet. They allow you to roll the saw forward and back, but not side to side. To make turns, you can lift up on the fence rails and rotate the saw. When you don't need the mobility, the wheels lock with thumbscrews.

The saw's fence is T-square style and worked very well. It's the only fence in the test that comes with a digital readout that displays the distance between the fence and blade down to thousandths of an inch. It's easy to zero out when you change blades and I found it to be accurate. Dust collection was fair.

The Baileigh did very well in the ripping test, but its miter slot was significantly out of parallel to the blade with the blade tilted to 45°. Fortunately, the trunnions are mounted to the cabinet, which makes it easy to fix. The power switch is very low on the cabinet, making it hard to reach with your hand or knee. Also, the riving knife and blade guard lock in place with the spin of a star knob. It's not difficult, but it is less convenient than the locking mechanisms on the Grizzly, SawStop, and Powermatic saws.

Digital fence readout. *The distance from the blade to the fence is displayed to a thousandth of an inch, and it's accurate.*

Built-in mobile base. *Four wheels in the cabinet allow you to move the saw forward and back. The wheels lock with a few turns of a thumbwheel.*

Long reach for the power switch. *Located beneath the height adjustment wheel, the switch requires you to lean over too far.*

"Powered through the ripping test better than any of the other saws."

GENERAL INTL. 50-200R M1

Price: $1,200

Motor: 2 hp, 230v

Table size: 20 3/16 in. by 44 3/16 in.

Rip capacity: 30 in.

Arbor-flange runout: 0.000 in.

Blade-to-slot parallelism at 0°: 0.001 in.
at 45°: 0.012 in.

Warranty: Limited lifetime

There's a 2-hp motor inside the cabinet of the 50-200R M1, and it powered the saw through the ripping test better than any of the other saws. It comes wired for 230 volts, but can be rewired for 115. Another highlight of the saw was how easy it was to switch between the riving knife and blade guard. Just flip a lever and pull up. Unfortunately, when the lever is in the locked position you cannot take a blade off the arbor, so you have to flip the lever up whenever you change blades. The arbor lock also made blade changes difficult because it requires you to push a small pin into a hole in the arbor. The pin barely fits into the hole and depressing the plunger for the pin wasn't easy.

Large handwheels made adjusting the height and tilt of the blade smooth and easy. The power switch is mounted to the front fence rail and made it a breeze to turn the saw on and off. The off paddle is so big that you can easily push it in with your thigh, a good thing when you need both hands to hold a workpiece steady on the table. Dust collection was good, too. There's a 4-in. port on the outside of the cabinet. It splits inside, with a 2-in. hose running up to the blade shroud, and the other half open to suck in anything that falls to the cabinet bottom.

Big wheels and paddle switch. *Adjusting the blade's height and tilt were quick and effortless on the General, and there was plenty of clearance for your hand as you spun the wheel. The stop paddle is big and easy to find with your hand or leg.*

Tricky arbor lock. *Located between the blade and throat opening—a tight squeeze for most hands—it took a fair amount of force to press the locking pin into a hole in the arbor.*

"Plenty of power, and the fence slid easily and locked securely."

LAGUNA FUSION

Price: $1,300

Motor: 1¾ hp, 110v

Table size: 27 in. by 44 in.

Rip capacity: 36 in.

Arbor-flange runout: 0.000 in.

Blade-to-slot parallelism at 0°: 0.020 in.
at 45°: 0.019 in.

Warranty: 1 year

If you have a garage shop that doubles as a place to park your cars, then the Fusion's built-in mobile base will come in handy. You can move the saw with ease and store it neatly against a wall when not in use. The saw has two casters. Pick up the fence rails like a wheelbarrow and the saw is ready to roll into action or back into storage. Thumbscrews lock the wheels so that it doesn't roll during use.

The motor provides plenty of power, and the T-square-style fence slid easily, locked securely, and resisted deflection. The magnifying curser makes the fence's scale easy to read. The power switch attaches to the front fence rail with two T-bolts, and can be positioned anywhere along the fence that's convenient, so you can get it in the exact right place for easy and safe use.

Although there was no arbor flange runout, the miter slot was significantly out of parallel to the blade at both 90° and 45°. Because the trunnions are mounted to the cabinet, it is an easy fix. Although it's not exactly difficult to switch between the riving knife and blade guard (just spin a star knob a few times), the process took longer compared with the Grizzly, SawStop, and Powermatic. Dust collection was fair.

Lift and roll. *The novel design of the Laguna's mobile base (it works like a wheelbarrow) made the saw very easy to move around the shop.*

Power where you want it. *The paddle switch can be positioned anywhere along the front rail, so no matter how tall you are or how long your arms are, it can always be within close reach.*

Fence scale is easy to read. *The large red line in the magnifying curser is perfectly sized to line up accurately with the lines on the scale.*

Bottom photos, this page and opposite: Roland Johnson

"An excellent saw. The fit and finish were as neat as a pin."

POWERMATIC PM1000

Price: $2,000

Motor: 1¾ hp, 115v

Table size: 27 in. by 40 in.

Rip capacity: 30 in.

Arbor-flange runout: 0.001 in.

Blade-to-slot parallelism at 0°: 0.000 in.
at 45°: 0.002 in.

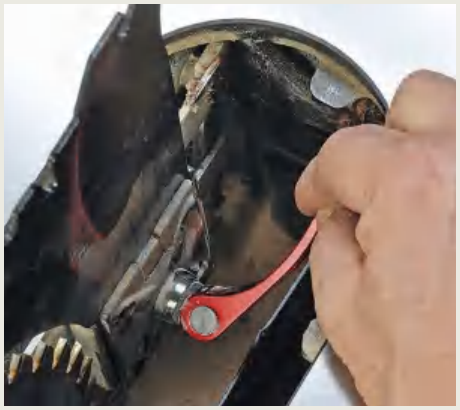
Warranty: 5 years

This is an excellent saw. It seems to me like a slightly smaller, but no less impressive, version of the PM2000, a cabinet saw that I've used in my shop for the last decade. The fit and finish were as neat as a pin. Equipped with a 1¾-hp motor, the PM1000 did very well in the ripping test. It's massive, too, weighed down by big cast-iron trunnions and a stout motor and arbor assembly. The T-square-style fence was solid, had the least amount of deflection, and was simply bigger and beefier than the other fences.

The riving knife and blade guard are locked in place by a cam clamp, making switches from one to the other quick and painless. There is a single leaf on each side of the blade guard, and they operate independently, so it's no problem to raise one above the fence for thin rips. A detent holds the leaf up. Blade changes are a breeze, too, thanks to an easy-to-use plunge lock on the arbor. The power switch is another great convenience, as it's perfectly positioned at hip height and easy to find with your hand or hip. Dust collection was good, too.

As good as the PM1000 is, it's a microscopically close second to the SawStop, only because it doesn't have a safety system that's equal to that on the SawStop.

Adjustment wheels roll easily. *A few fingers on the knob is all it takes to spin the height and tilt wheels. The action is smooth with no lash in the gears.*



Cam lever simplifies riving knife. *The lever is within easy reach and can be opened and closed with just two fingers.*

A great arbor lock. *There's plenty of room for your thumb and it takes little effort to depress the lock.*

Open Rack for Hand Tools

Build it by hand and enjoy the benefits

BY DAN FAIA

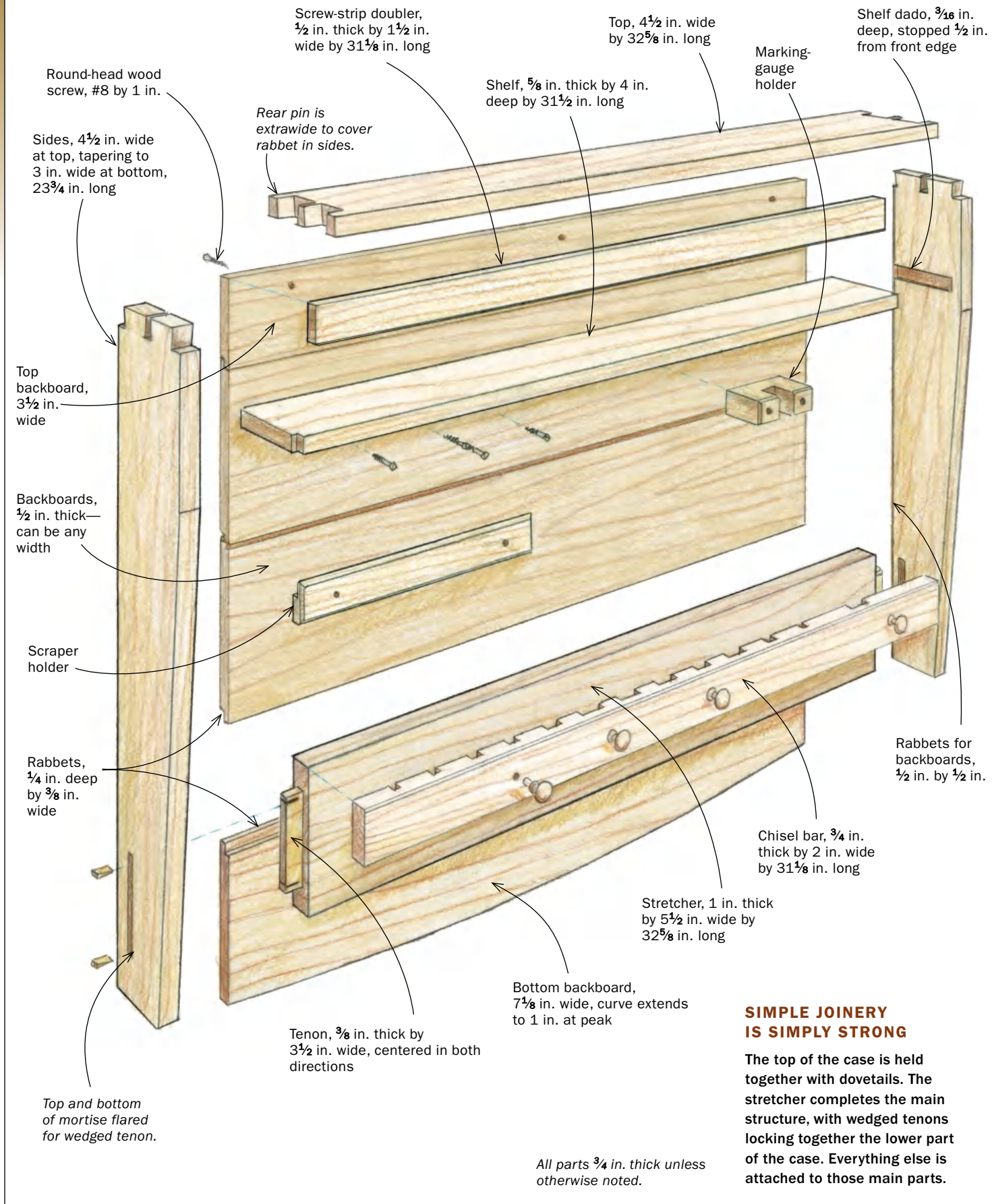
For the first few years in my new shop, I worked out of a tool chest. Or at least I tried. A pile of tools took over my workbench, battling with workpieces and wood shavings. I wasted a lot of time working around the clutter. That's when I decided to hang my most-used hand tools on the wall behind the bench. At first I used whatever hooks and holders I could come up with, but this new approach had an instant impact. Making my tools easier to access not only made work easier but also encouraged me to put tools away. The clutter dissipated and the workbench became a pleasant area to work.

To take my wall-hung tool storage to the next level, I designed the rack you see here. Although compact, it will hold and display all of the essential hand tools for a modern furniture maker. (For my personal list of essential hand tools, and why each one deserves its place in the rack, see Handwork on p. 78.) Your list may not match mine, so I made the rack design versatile enough to adapt to almost any collection.

I figured out the dimensions and layout by spreading out the tools on the bench and arranging them as they might go in the rack. I wanted my two bench planes on top, so I simply lined up my No. 4 and No. 7 nose to nose to get the overall width. I took the depth from the widest tool, adding a little extra space plus the thickness of the case back. To get the overall height, I arranged the entire set of tools as they would go on the shelf, in the chisel rack, and on the various hangers.

You can build the rack from almost any wood, but I chose Eastern white pine, mostly because of its light weight. The tools themselves are quite heavy, so I wanted to keep the rack on the lighter side.

I went with traditional joinery that is both strong and straightforward. These classic joints are also a good hand-tool exercise, and I'll show you how to execute most of them. Through-dovetails join the case sides to the top, with the tails located on the sides to resist the weight pulling downward. The lower stretcher ties the case sides together with wedged through-tenons. The wedging action has a mechanical effect similar to the dovetails, completing a rock-solid case. The shelf can then sit in simple stopped dadoes, and the back can be made of shiplapped boards. I ran the backboards side to side so that I could



SIMPLE JOINERY IS SIMPLY STRONG

The top of the case is held together with dovetails. The stretcher completes the main structure, with wedged tenons locking together the lower part of the case. Everything else is attached to those main parts.

Photos: Asa Christiana; drawings: Kelly J. Dunton

Pins first. *Faia cuts his dovetails pins first, sawing right to his pencil lines. He uses a coping saw to remove most of the waste, and pares to the baseline with a wide chisel as shown, working in from both sides.*

Dovetails at the top

The tails go on the side boards, carrying the weight of the rack hanging below.

Transfer carefully. *Hold the pins board against the tails board, lining it up carefully. Use a hard, sharp pencil to transfer the location of the pins, and then carry the layout around the end of the tails board.*

glue in the topmost one, which holds the long screws that attach the rack to the wall.

Start with the dovetails

Mill the sides, top, and stretcher to thickness and cut them to length. The stretcher should be left ⅛ in. to ¼ in. longer than the top to allow some extra material for its tenons to be wedged. (Afterward the tenons are planed flush to the sides.) This is a good time to rabbet the sides to accommodate the backboards later.

Construction starts at the top. I cut the dovetails pins first and used hand tools throughout. I set a marking gauge to the thickness of the stock and scribed the dovetail shoulders on both the top and sides. I used a pencil to lay out the pins on the end grain and then squared them to the shoulders.

After sawing the pins, coping out the waste, and paring the shoulders, check that the cheeks and shoulders are flat and square to the face of the board, and pare them if they're not. Next, transfer the pin locations on the top board to the case sides using a sharp pencil with hard lead (No. 3). Continue the square pencil lines across the end grain. Now saw, chop, and pare the tails to fit.

Now the mortise-and-tenons

It's always easier to cut mortises first and then make tenons to fit.

Pine is forgiving. *After sawing the tails right to the layout lines, you shouldn't have to pare them. But if you do, pare sparingly with a wide chisel.*

So lay out the two through-mortises now, on both the inside and outside faces of the sides. Use a marking gauge and marking knife (vs. a pencil) for accuracy and to prevent chipout on that all-important outside face where the tenons will come through. It will also be cleaner to cut these mortises from the outside face in, regardless of whether you use power or hand tools.

After cutting the mortises, lay out the tenons. To ensure that the rack sides end up parallel, with square joints, start by marking a light centerline on both the top and stretcher, and clamp the two together, using a marking knife to transfer the shoulders of the dovetails to the stretcher board. Finally, square the shoulder marks around the stretcher. Next, lay out the tenon cheeks. Start by determining the width of the back shoulder (or the distance

SOURCES OF SUPPLY

HARDWARE FOR HANGING TOOLS

LeeValley.com

Cast steel classic knobs, ¾ in.

Single coat hooks, oiled bronze finish

Pyramid-head screws, #8 by 1 in., and #8 by 1¼ in.

Square-cut nails, assorted

Mortise-and-tenons lock in the stretcher

Cut the stretcher extralong, so the tenons will stick out a bit at each end. You'll level those later, after driving in the wedges.

START WITH THE MORTISES

Scribed layout makes for cleaner cuts. *Use a marking gauge to scribe the sides of the mortise. Scribe the corresponding line on each case side before changing the setting on the gauge.*

to the back cheek). I set dividers to the distance from the rabbet to the rear mortise, and transferred that to both ends of the stretcher, which ensures that the stretcher meets the back of the case evenly. After sawing the tenons, plane or pare the back cheek right to its scribe line, to be sure the back of the stretcher ends up flush against the backboards. Use the front cheek to fit the tenon to the mortise.

After milling the shelf to thickness, leave it a bit extralong and extrawide. Then dry-assemble the four main pieces of the rack to locate the shelf dadoes. To avoid weakening the sides, the dadoes are shallow, about 3⁄16 in. You can mark the depth with pencil on the front edge; the router plane will ensure uniform depth.

Fit your tools to the chisel bar

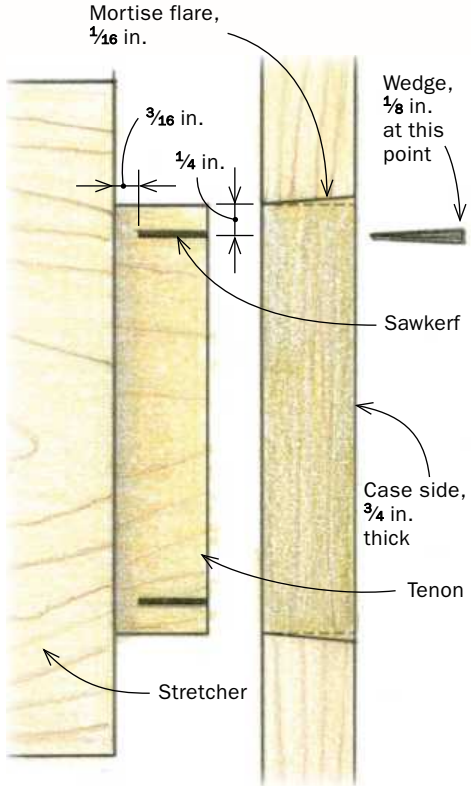
The chisel bar is simply a dadoed stick that is glued or screwed to the stretcher. Cut the chisel bar to length, matching it to the shoulder length of the stretcher. You might be tempted to assemble the whole rack before gluing in the bar, but the overall assembly will go easier with the bar already glued to the stretcher, providing a larger surface for the sides to register against. Before committing to these dadoes, mock up the tool layout a few ways. Then cut these short dadoes the same way you did the shelf dadoes. Before attaching the bar to the stretcher, dry-clamp them together to check how the tools fit. Adjust as necessary. If you are committed to your tool set, as I am, you can glue on the bar permanently. If you are still assembling the perfect collection, use

Drill and chop. *After drilling out the waste, do most of the chisel work from the outside face, which is the most important. Work slowly back to your scribe lines.*

Flare the mortises. *Mark both ends of each little taper. One mark goes on the outside face, and the other goes inside the mortise. Connect the marks with chisel cuts.*

FLARE MATCHES FLARE

For best results, flare the ends of the mortise to accommodate the depth of the sawkerfs in the tenon and the thickness of the wedge.



Scribe and saw. *For both the shoulders and cheeks, use a knife to mark the layout and then keep the sawcuts on the waste side. To make the long cheek cuts, saw first into one corner as shown, come from the other side and saw into the other corner, and then finish the job with the saw level and the first two cuts guiding you.*

screws to attach the bar, so you can change it out later. When locating each screw, be aware of where other hardware will be attached to the front of the bar.

Prep the mortises for wedging, and glue up the case

For wedging to work well, you must flare the top and bottom of the mortise. This prevents splitting and ensures that the parts won't pull apart. The tenons are not split all the way down to the shoulder, so the mortises aren't flared all the way down either. Now prepare some wedge stock to match the thickness of the tenon. I laid out the same flare angle on the wedge stock, and used a dovetail saw to cut the wedges. Then, using a chisel and simple notched guide block, I trued each wedge surface. The last step before assembly is to taper the sides of the case.

One of the great things about traditional joinery is how easy it makes assembly. Be sure the case glues up square. Do not add the shelf yet. While the glue is still wet and the clamps are still on, put a little glue on each wedge and drive it in. Since there is one at each end of the tenon, you'll need to go back and forth, driving each wedge a little at a time. Stop when there are no gaps in the mortise and the tone of the hammer blows changes to a harder knock, indicating that the wedge is seated. Once the glue has cured, the excess tenon and wedge material can be planed flush.

You know the shelf thickness is right because you made the dadoes to fit it. Start by cutting it to precise length, leaving it a bit wide. Now lay out and cut notches at the front end for the stopped dadoes. Then, with the shelf in place, flush with the front edge of the rack, mark the location of the rabbets on the back edge of the sides. Rip the shelf to this mark, but don't glue it in just yet.

Add the shiplapped back

Determine the layout for the shiplapped back, depending on the width of your lumber. Screw and glue in the top and bottom boards, but to allow seasonal wood movement, leave gaps around the middle boards and use only screws to attach them. The ½-in.-thick boards will accommodate most hardware, pegs,

CUT AND FIT THE TENONS

Pare the shoulders. *Use a wide chisel to work your way across the shoulders, setting the tip of the chisel in the knife line each time.*

Use a shoulder plane to fit the cheeks. *Do most of the planing on the front cheek, so you don't change the distance at the back. Then notch the ends to cut the tenon to width.*

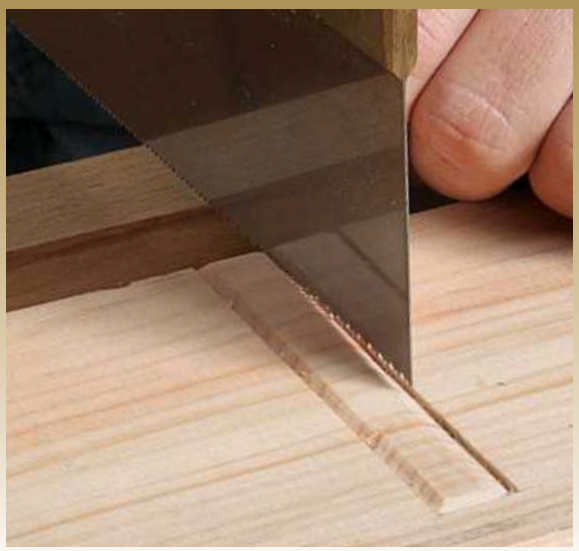
Kerf the tenons. *Saw ¼ in. from the ends and stop 3⁄16 in. short of the shoulder.*

Tricks for clean stopped dadoes

The shelf slides into shallow, stopped dadoes, which are easy to cut with hand tools.

Scribe the edges. *Dry-fit the case and measure from the top to mark the first edge. Use the actual shelf to position the square for scribing the second line.*

Ramp the scribe lines. *Take an angled chip along the inside edge of each line. Do the same at the stopped end.*



Small shoulder guides the saw. *Rest a backsaw against the shoulder. Pull it backward to start the cut, and then tilt it to cut down to depth at the front edge before leveling the saw and finishing the stopped cut with short strokes.*

Rough out the waste. *Use a bench chisel to pare out the waste between the sawcuts, stopping a little short of the bottom. Don't push too hard at the stopped end or you could chip the wood past the stopping point.*

Router plane finishes the job. *Lower the blade bit by bit to clean up the bottom of the dado. Use a chisel to chop the edges deeper if necessary.*

and screws for hanging tools. For easiest clamping, attack the rest of the assembly in the following order. Glue and screw in the top backboard. Then, while you have easy clamp access to the area, glue the screw-strip doubler into the top corner of the case. This ½ in. of extra wood helps to support the screws that attach this heavy case to the wall. Now glue in the shelf, and then screw on the rest of the backboards with small expansion gaps between them.

Before attaching the hooks, knobs, nails, and custom hangers, double-check the positions of all the tools and add a simple shellac finish. To hang the rack, drive screws through the back and into wall studs. Now stow your hand tools and start working. □

Dan Faia is a custom furniture maker and the head of the Cabinet and Furniture Making Program at Boston's famed North Bennet Street School.

Mark the shelf notches. *After milling the shelf to thickness and length, slip it into its dadoes as far as possible and make a knife mark at the shoulder. Then remove the shelf and cut the notches at the front edge.*

Assembly is easy

It shouldn't take much pressure to glue up the case. Check diagonals to make sure it comes together square.

Wedge the tenons. *Grooved clamping blocks accommodate the extra tenon length. Keep the clamps on while you drive the wedges.*

Glue in the top backboard and the shelf. *Screw it into place at the ends, but also clamp across it to strengthen the glueline at the top edge (above). Now glue and clamp on the screw-strip doubler while it is easy to access, and then rip the shelf to width and glue it in (right).*

The rest of the backboards. *Note the screwing pattern, designed to hold down the backboards while letting them shrink and expand. The bottom board is fully screwed and glued, like the top one.*

Shopmade Tablesaw Inserts

Get cleaner, safer cuts with every blade you use

BY BOB VAN DYKE

The throat-plate insert that comes with most tablesaws can give you headaches. The main problem is that the wide opening doesn't back up the fibers in the wood being cut, which leads to excessive tearout as the blade exits the wood. That big gap also allows small offcuts to fall into the opening and get jammed. And when ripping, thin strips of wood can jam in the gap and kick back very easily. The same can happen with a thin offcut.

The answer to these problems is simple: Use a zero-clearance insert, in which the opening is custom-sized to the blade, eliminating gaps. As a result, wood fibers don't tear out and there is no space to trap offcuts.

While you can buy insert blanks, they can cost a lot. A better option is to make your own. It's cheaper, and you can make one for every blade you might use (standard and thin-kerf, dadoes) and for every common angle (90°, 45°, etc.). The method I'll show you

Make a batch while you're at it. *With Van Dyke's method you can easily make a bunch of inserts at once, enough to cover your standard blade, any common angled cuts, and for the dado set sizes you use the most.*

Photos: Dillon Ryan

is fast and so easy you might as well make a dozen blanks to cover every situation. The increased safety and precision will be well worth the short time spent.

Use the stock insert as a template

For the insert material, I use plywood that is a little thinner than the actual depth of the opening, typically ½ in. thick. I prefer Baltic-birch plywood because it's more stable, stronger, and holds the threads I tap into the inserts very well. Make sure that the plywood is flat. The first insert I make is always a master blank that all subsequent inserts will be taken from.

To make the master blank, use the stock insert that came with your saw as the template. Using the tablesaw or bandsaw, cut a plywood blank about ¼ in. bigger than the insert. Take the leveling screws out of the insert, and trace its profile onto the blank. Transfer the leveling screw hole locations to the blank at the same time. Use a bandsaw to rough out the shape.

Screw the stock insert to the blank using the holes that the leveling screws were in. Use the router table and a flush-trimming bit to rout the blank flush to the insert. The stock insert has a cutout to accommodate the splitter or riving knife. Because the flush-trimming bit could jam in that cutout and kick back, I fill in the opening with a piece of pine and temporarily tape it in place.

After routing, take apart the two pieces and drill a ¾-in. finger hole into the master blank. It should fit easily into your saw's throat opening. Repeat this process using the master blank in place of the stock insert to make as many insert blanks as you need.

Level the insert flush with the table

The new insert must be flush with the top of the tablesaw. In most cases, the

ROUGH OUT THE INSERT BLANK

A simple tracing. *Use the plate that came with the saw to transfer the outline to the plywood.*

Use the original as a routing template. *After roughing out the master blank, screw the original insert to the blank. Then use a flush-trimming bit at the router table to get a perfect replica (left). A wood filler strip in the open end of the insert prevents the bit from catching. Once the master is done, screw it onto another blank to make more insert blanks (right).*

LEVEL FROM ABOVE

Threads in ply. *Predrill the adjustment holes in the insert and then use a tap to make the ¼-20 threads in the plywood.*

Get the inserts flush with the table. *Using a straight rule and Allen key, bring the plate up until it's flush against the ruler and doesn't rock on the adjusters.*

CUT THE BLADE SLOT

Make way with a dado blade. *A standard 10-in. blade won't let the insert sit flat, so use a single blade from an 8-in. dado set (above) to make a clearance slot for a standard 10-in. blade. Clamp a strip of scrapwood to the fence and position it right over the blade (right). The dado-blade kerf should go a little more than halfway through the insert (below).*

Finishing cut. *With the 10-in. blade installed and the scrap block clamped over the blade, raise the blade to its full height to create a perfect zero-clearance slot.*

½-in. plywood will be just below the top, and will need to be raised flush. For that job, I use ¼-20 Allen leveling screws. I drill and tap through-holes for those screws so that I can adjust the height quickly while the insert is in place.

Knowing where to drill is easy. Just use the holes you drilled to attach the stock insert to the plywood blank. Set up a 3⁄16-in. bit in the drill press and drill through-holes in those spots. Tap them using a standard ¼-20 machinist's tap. You may be surprised that you can thread Baltic-birch plywood, but it works great. Thread a ¼-20 by ⅜-in.-long Allen-head set screw into each hole. Remove the blade, install the new insert, and level it.

Cut the zero-clearance slot

When the insert is level, it's time to cut the blade slot. Do this by raising the spinning blade through the insert. Because a 10-in. blade doesn't fit under the insert, I use a single 8-in. dado blade first to create a clearance groove to get the slot started, then change to the 10-in. blade to finish.

Firmly clamp a piece of scrapwood to the fence and then position the fence so that the scrap is directly over where the blade will come through. This holds the insert down as you raise the blade to full height. It also backs up the cut and minimizes tearout.

Cut the slot for the riving knife or splitter— For the standard blade insert, you'll need to cut

Drawings: Michael Pekovich

Extend the slot. *With a fence and a ⅛-in. spiral bit, extend the kerf from the blade toward the back of the insert to allow the use of a riving knife or splitter. Use the blade kerf to set up the fence and use a stop block to safely start the plunge cut.*

a slot to receive the splitter or riving knife. After marking where it starts and stops, I cut this slot with a ⅛-in. spiral router bit using a router table with a stop attached to the fence.

Saws that require special inserts

Some saws use a thin insert. For these, make the standard ½-in.-thick insert in the same way as above, including drilling the holes for the Allen screws. When you put the insert in place, it will project above the saw table. Measure the amount of projection, add 1/16 in. to that measurement, then use a router table to cut a rabbet to that depth along the bottom edge of the insert. A ¾-in. rabbet is usually sufficient to clear the adjustment tabs on most saws. The leveling screws will let you raise the insert flush with the saw table.

SawStop brand saws also require a bit more work to be done to the basic insert to clear the arbor washer, a part of the cast-iron trunnion, and the dust-collection shroud. I mapped out the required cuts and holes, so you don't have to (see drawing, right).

Try making inserts for your saw. Not only will you get cleaner, safer cuts, but you can also see exactly where the blade is cutting—that slot in the insert tells you everything. □

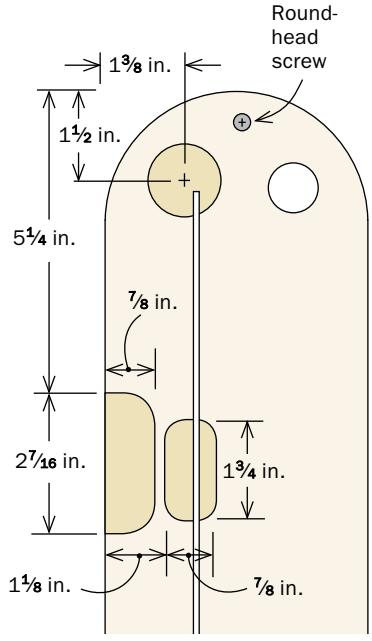
Bob Van Dyke is the founder and director of the Connecticut Valley School of Woodworking.

TIP Adding a splitter

If your saw doesn't have a splitter or riving knife, you can add a shopmade splitter by routing out behind the blade and gluing in a piece of ⅛-in. plywood. Van Dyke installs an oversize splitter so that when the blade is raised, it will cut the splitter to perfectly match the blade.

INSERTS FOR SAWSTOP SAWS

The insert for the SawStop is no different than for any other saw, except for a few clearance cutouts on the underside that allow the blade to raise up fully (below). Use a Forstner bit or router bit to waste away the wood that is in the way. The drawing below serves as a map. To prevent the insert from tipping, install a short round-head screw in the bottom at the front (bottom). It bears against a cast-iron ledge and when properly adjusted prevents downward deflection.



Recesses are ¼ in. deep.

Restore a Vintage Vise

Built to last and easy to refurbish, sturdy old vises are a great bargain

BY STEVE LATTA

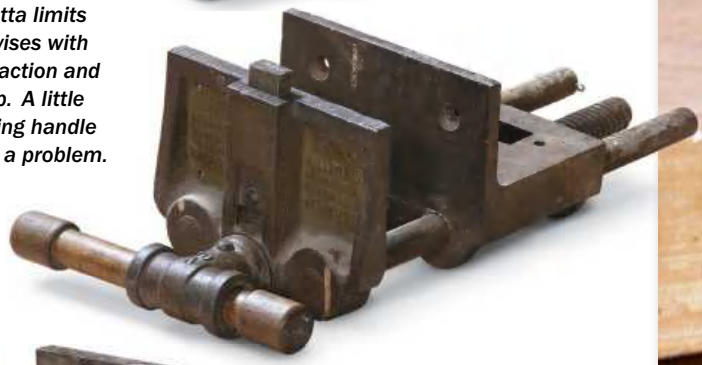
I've acquired a lot of vises over the years—without buying new ones. Good old vises with plenty of life in them are easy to find and inexpensive, and refurbishing them is actually a pleasure. Bench vises aren't complicated—most come apart with the removal of a few pins or bolts. After that, cleanup consists of removing the rust, freeing stuck parts, and applying a fresh coat of paint. Depending on their condition, you might also replace the jaw pads, handle, and benchdog. Add a little wax to lubricate the moving parts, mount it to your bench, and your new old vise is ready for many more years of service.

Buyer's guide to vintage vises

There are a lot of solid vintage vises available, so don't compromise on features. I'd limit the search to vises that mount to the bottom of the bench with bolts. I prefer a vise with a quick-release screw, jaws that are 4 in. deep, and preferably a benchdog, too. You won't go wrong with brand names like Abernathy, Columbian, Wilton, Record, and Brodhed-Garrett. I'm pretty picky about the vises I buy, and I still usually get them for a steal. Deals can be had for as low as $40.

Find a workhorse to revive

Made in great numbers and virtually indestructible, old bench vises are easy to find. Many shops, flea markets, and websites that sell old tools will have a selection of them.



Some favorite vises. *Good options for an old vise are, from top, Wilton, Abernathy, and Columbian. Latta limits his search to vises with quick-release action and jaws 4 in. deep. A little rust or a missing handle or dog are not a problem.*

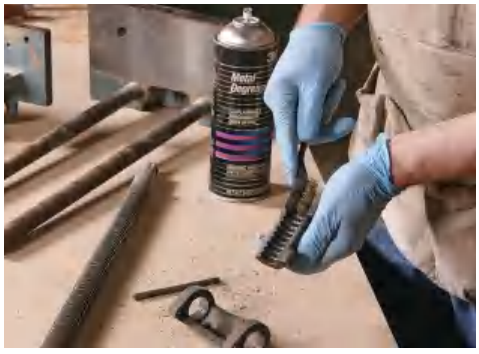
Not worth the trouble. *Pass on any vise with a broken casting, like this Columbian.*

3-step rehab

1. TAKE IT APART

Remove the handle first. *A hammer and punch will usually remove the pin holding the handle head to the main screw shaft (above). A more ornery pin can be drilled out on the drill press and replaced with a roll pin at reassembly. Then completely disassemble the vise, using penetrating oil if necessary. Document the disassembly with photos to make reassembly easier (right).*

2. CLEAN AND PAINT



Brass brush for light rust. *Latta uses degreaser and a brass-bristle brush to clean the threads of the quick-release mechanism.*

Renew the guide rods. *After knocking off most of the rust with sandpaper, Latta rubs the guide rods with a gray, medium-grade 3M abrasive pad. He finishes the job with 000 steel wool.*

Wire wheel for deep cleaning. *A wire wheel reaches into the threads of the main screw. If necessary, Latta also uses the wire wheel for heavier rust on the vise's main castings.*

Quick coating. *After applying primer, Latta sprays a topcoat of flat black paint onto the castings. A wrapping of cellophane protects the freshly cleaned guide rods from overspray.*

I've paid up to $80, which is still less than half the cost of a new vise of the same quality.

A little rust isn't usually a problem, but stay away from anything that's not fully functional. I don't mind a missing or worn-out handle or benchdog—they can easily be replaced—but other than that, the vise should have all its parts.

Look for solid main castings. The cost of repairing a vise with a cracked or broken body makes me steer clear. I'd also pass if the working components have too much play and the overall feel is sloppy. If I tighten the screw and it pops or slips under pressure, that vise won't find a home in my shop. Carefully inspect the threads and quick-release mechanism for worn, chipped, or broken threads.

Also, check the alignment of the jaws: They should be parallel across their full width, but they should meet at the top before

Photos: Jonathan Binzen; drawings: John Tetreault

3. BRING IT BACK TOGETHER

Reattach the head. *Add grease to the end of the main screw's shaft before reinstalling the handle head. Nylon washers can be used as spacers to take up any play in the shaft (left). You can replace the original pin with a roll pin (above).*

the bottom. You'll often find jaws that are racked out of parallel. If the difference is 1/16 in. or less, you can correct it by adding wooden jaw pads and tapering them to compensate—I always add pads anyway. Anything much more than 1/16 in., though, is a major misalignment that's not worth trying to correct.

Give it a good cleaning

Once you have the vise, the refurbishing process is quite simple. It begins with a complete disassembly and thorough cleaning. As I disassemble I always take photos so it's easy to ensure that all the parts go back together in the right order and orientation. Parts that are bolted together can be stubborn, but penetrating oil, patience, and a big wrench should get them loose. If the spindle head casting is pinned to the screw, knock out the pin with a hammer and punch. A pin that won't budge can be drilled out and replaced. In cases where the head casting is pressed on, it's probably better left attached.

Clean the main screw on a wire wheel to remove any rust or grime, and do the same to the guide rods and any other unpainted parts. Clean the mating threads on the quick-release mechanism too. They are often made of a softer material, so instead of using the wire wheel, I go with hand power, using a small brass-bristle brush with a little degreaser. Once all the threads are clean, wipe them down with paste wax to keep them from rusting again.

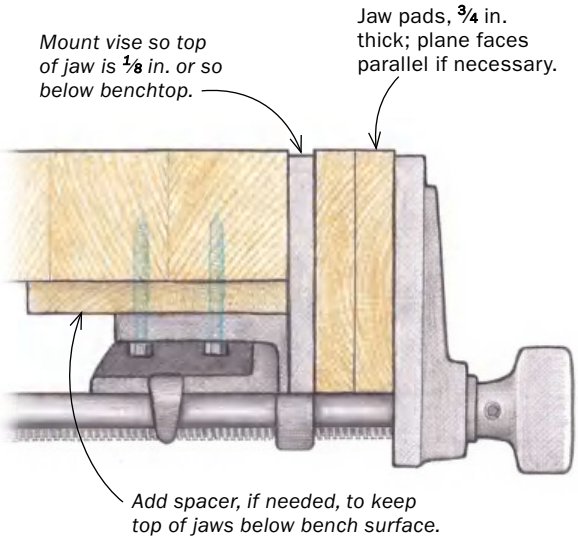
The condition of the main cast-iron parts determines their treatment. Usually all that's needed prior to painting is a good scrubbing with degreaser and a brush or rag. If the castings have moderate rust, use a wire brush to clean it off. For really rough, rusty parts, use a wire wheel in a power drill or on a bench grinder. I don't aim for cosmetically flawless surfaces—to me, this is a tool that's made for tough work, and it doesn't need to look perfect.

Wax away. *Coat any exposed metal with paste wax to promote smooth sliding and inhibit rust.*

Careful assembly. *With the parts painted and prepped, follow your photo trail for an error-free assembly.*

Easy install

Back on a bench. *After bolting the vise to the benchtop, Latta checks the jaws to see that they are parallel as they close. If they aren't, he adjusts the fit by unscrewing the front jaw face and handplaning it to a taper.*

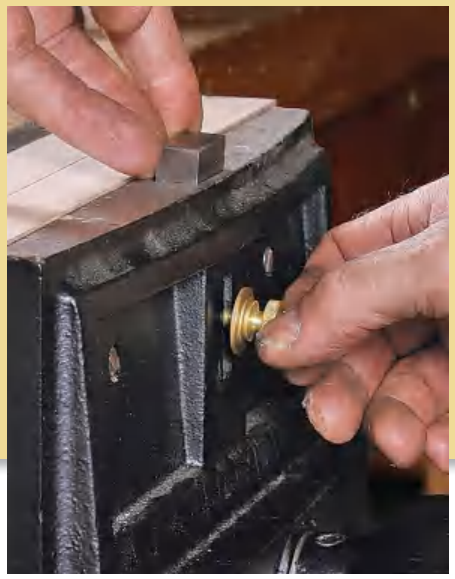


Article Extra
Learn how easy it is to install a cast-iron vise on your own bench.

TIP

NO DOG, NO PROBLEM

If the dog on your vise is missing its lifter, you can drill and tap the dog and install a knurled knob. If the dog itself is missing or badly worn, you can make a replacement in hard maple.



Once all of the cast parts have been cleaned, prime and topcoat them with a basic rust-inhibiting aerosol spray paint like Rustoleum or Krylon. I typically use flat black to avoid glare when the vise is in use.

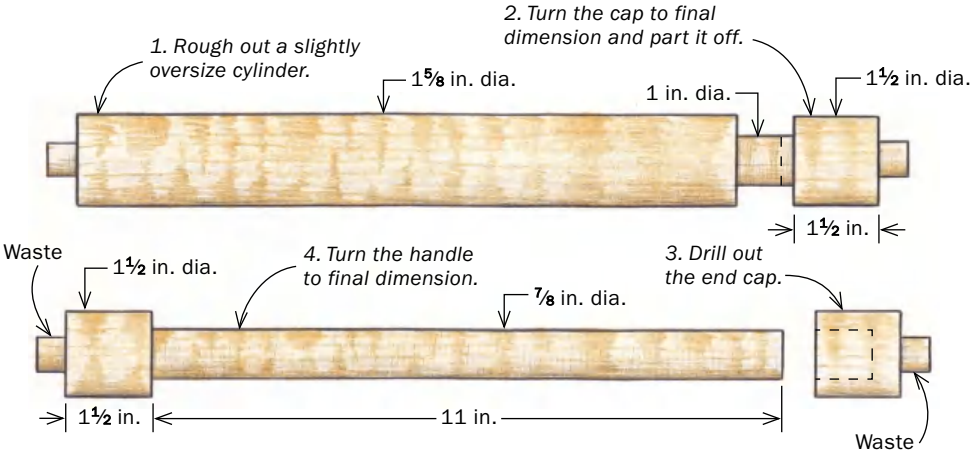
Put it all back together—better than before

With the paint dry, it's on to reassembly. If you removed the spindle head from the main screw and you find that it's loose on the shaft, you can remedy the problem by wrapping the screw shaft with Teflon tape. If there is play between the spindle head and the front jaw casting, you can add nylon washers to tighten the action—they'll reduce friction, too, so the handle will spin more smoothly. Some vises have a plate at the back that ties the guide rods to the center screw. Adding a washer here can help reduce slop in the screw as well.

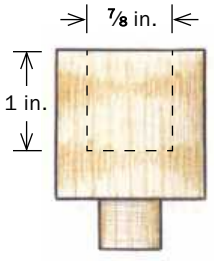
Wipe down all the bare steel parts with a little paste wax. It helps them slide, prevents rust, and keeps dust and dirt from sticking. If you don't have wax handy, a light film of 3-in-1 oil will suffice.

Next, make hardwood pads for the jaws. I usually make them about ¾ in. thick. I don't think you need them any thicker than that, and the thicker they are the more you reduce the capacity of the jaws. If the jaws don't close evenly, taper one pad with a handplane until the two top edges are parallel when they meet. If you'd like a benchdog but your vise has no dog slot in the casting,

Turning a new handle is a great way to personalize a vintage vise. Latta turns his in two steps, first creating and parting off one end cap, then remounting the workpiece to turn the shaft and the other end cap.



Start with the cap. *After roughing the whole blank to a cylinder, turn the cap portion to final size, part it off, and drill the mortise (above). Then turn the rest of the handle, stopping to check the fit to the end cap as you approach final size (left).*



you can make the front jaw pad 1 in. or so thick and drill it for a round-shank dog.

If the handle of your vise is damaged or missing, make a new one out of hardwood, like maple. For me, turning the handle is a nice little ritual for bringing the process to an end. I find that around 13 in. is a good length.

I turn the whole blank to a slightly oversize cylinder, then bring one end cap to final size and part it off. Cut a 1-in.-deep recess in the cap at the drill press with a Forstner bit. Remount the blank and turn the rest of the handle, carefully bringing the shaft down to diameter so the cap fits snugly. Finish the handle with wiping varnish and a coat of paste wax and install it. Now mount your finished vise and appreciate the fruits of your labor—you should be doing so for quite a long time! □

Contributing editor Steve Latta teaches woodworking at Thaddeus Stevens College of Technology in Lancaster, Pa.

Cap it off. *Rubber O-rings serve as shock absorbers. Slide them onto the handle shaft, one on each side of the head casting, then glue on the end cap.*

Clever Countertop

Smart design reduces clutter and expands your work area

BY DOUGLAS CAMPBELL

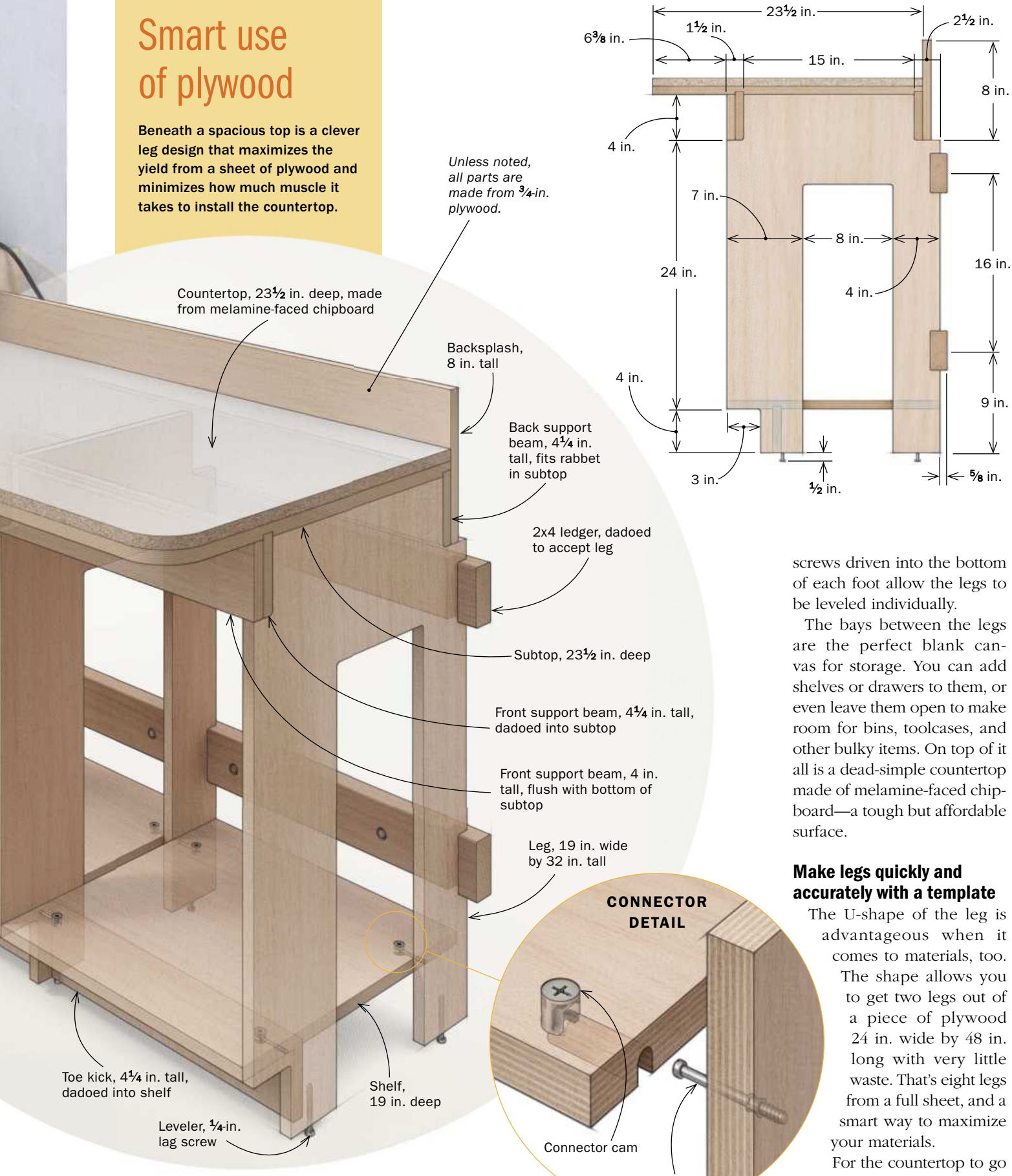
In a woodworking shop, counter and storage space are a lot like clamps: You can never have too much. That's why when I built my new basement shop, I reserved an entire wall for a long work counter with storage beneath it. I intended to build and install this counter by myself, so I designed a countertop and base that I could make and install without help. My other goal was to minimize the amount of material needed to build them.

This counter was not going to be built like the floor cabinets in a kitchen. The big plywood boxes used in kitchens require a lot of plywood and are heavy and cumbersome—a bad combination for a one-man crew. So instead of boxes beneath the counter, I decided to use legs. But legs carry their own problems: They can be tricky to level on a sloped floor (and many shops have one), and they need aprons to support the countertop, which requires joinery of some sort.

To overcome these challenges, I devised a simple plywood leg shaped like an inverted U. This shape works because it gives you a pair of legs with a horizontal edge to support the countertop without the need to cut any joinery. Hex-head lag

Smart use of plywood

Beneath a spacious top is a clever leg design that maximizes the yield from a sheet of plywood and minimizes how much muscle it takes to install the countertop.



screws driven into the bottom of each foot allow the legs to be leveled individually.

The bays between the legs are the perfect blank canvas for storage. You can add shelves or drawers to them, or even leave them open to make room for bins, toolcases, and other bulky items. On top of it all is a dead-simple countertop made of melamine-faced chipboard—a tough but affordable surface.

Make legs quickly and accurately with a template

The U-shape of the leg is advantageous when it comes to materials, too. The shape allows you to get two legs out of a piece of plywood 24 in. wide by 48 in. long with very little waste. That's eight legs from a full sheet, and a smart way to maximize your materials.

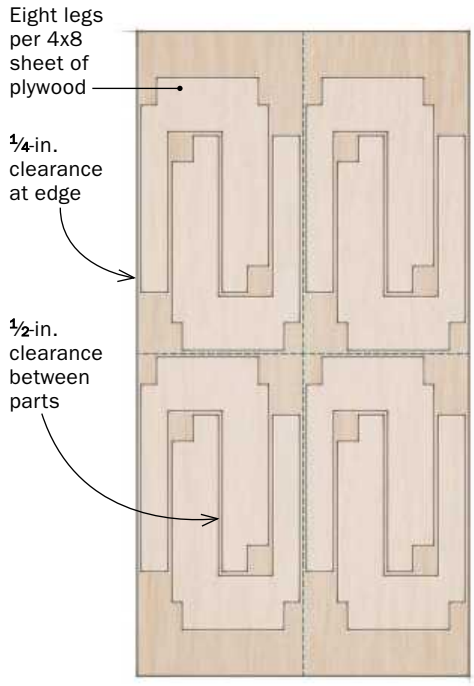
For the countertop to go together easily, square, and level, it's important that all the

Plywood legs made in bunches

With this design, you can cut eight legs out of one sheet of plywood. To ensure uniformity from leg to leg, Campbell used a template and routed each leg to it.

Screw the template to the plywood. *This guarantees the template is in the same location when you trace it and then rout the leg flush to it. Inset the template ¼ in. from the edges of the plywood.*

NESTING LAYOUT SAVES MATERIAL



Double up to reduce waste. *Each pair of legs comes from a 2-ft. by 4-ft. section of plywood. Mark the first leg (right), remove, flip, and reattach the template (below). There should be ½ in. separating the two legs.*

Split the difference. *Cut down the middle between the two legs. Holes drilled at the inside corners allow you to cut out the leg with a single, continuous jigsaw cut.*

Trim them flush. *After reattaching the template, rout the leg flush with a pattern bit.*

Make way for the shelf fasteners

Shelves that drop in after the legs and subtop have been installed make construction less complicated. Knock-down hardware makes this possible.

A hole for the cam lock. *Use a Forstner bit (15mm) and a drill press—and its depth stop—to get flat-bottom holes of the correct depth (left). Rout a slot to fit over the pin using ⅜-in.-dia. core-box bit (center). It needs to be centered on the cam lock's hole. You also need to drill a hole in the leg to hold the pin (right).*

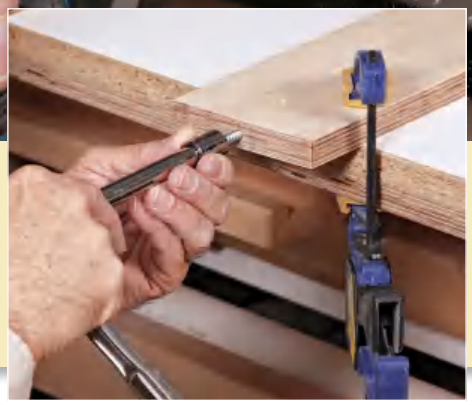
RTA Connectors
wwhardware.com
Titus Series 5 cam (T5653 ZN), 29 cents
Dowel (T9424 ZN), 28 cents

legs beneath it are identical. Variations in the notches for the subtop support beams, for example, could throw the top out of level or make it wavy instead of flat. This is why I used a template to lay out each leg (screw it to the plywood before tracing).

After laying out the legs—two nestled in each quarter sheet of plywood—you can cut them out with a jigsaw. The template helps with the cutting, too. Just split the waste between legs, screw the template back to the leg, and rout it flush to make identical legs.

The rest of the countertop components are straightforward to make. But note that the hole and slot for the cam-lock hardware in the shelf must be cut precisely so that the hardware goes together smoothly during assembly. Take your time when setting up the drill press for the hole and the router table for the slot, and you'll be fine.

SIMPLE LEG LEVELERS



Two-step installation. *Drill a pilot hole for the bolt, centered on the leg's bottom edge, using a block of wood over the bit as a depth stop (above). Take care to keep it square. Then drive in the bolt with a socket wrench (left). A drill or impact driver might strip the threads.*

Installation is a one-man show

The countertop is assembled in place, one piece at a time, which means you don't need to call a friend for help and you won't strain your back, either.

Hang the ledgers. *After cutting dadoes for the legs, drive lag screws (with washers under the head) through pilot holes and into the studs. Counterbores allow you to sink the screw heads beneath the ledger's surface.*

Stand the legs in place. *Do not attach them at this point. The dadoes will hold them up for now.*

Drop on the subtop. *Screw the back splash and front support beam to the subtop, then place the assembly on the legs.*

Level the legs. *Turn the lag screw with a wrench, keeping an eye on a level resting on the subtop.*

Screw the legs to the ledger. *Campbell uses drywall screws, toenailed through the ledger, to lock the legs in place.*

You should also take care when cutting the dadoes for the toe kick and subtop support beams. Dadoes that are too wide will affect the assemblies' overall strength. Plywood is always slightly thinner than its nominal thickness, so adjust your dado set accordingly.

No need for help with this installation

After making all of the individual parts, you can begin building the countertop. This is where the leg and countertop design really pays off, because you can do the entire installation by yourself.

Start by making and hanging the ledger boards, which attach to the wall studs and help support the counter. After they are in place, stand up the legs in the dadoes cut into the ledger boards, leaving them loose so that they can be adjusted for level.

The subtop is supported by two beams. The front one is made from two layers of plywood, glued and screwed together. Attach the beams to the subtop, then place the subtop assembly on top of the legs. Put a level on the subtop and adjust the legs with the lag-screw levelers. Check for level front to back and along the subtop's length. Now use drywall screws to secure the legs to the ledger boards and the subtop to the legs.

The shelves go in next, and this goes quickly because all you have to do for each shelf is rotate four cam locks a quarter-turn with a screw driver. After rounding out the corners on the melamine countertop, put it in place and screw it to the subtop from below. Finally, rout the corners of the melamine countertop flush to the subtop below.

Now you can load up the bays with power tools and storage bins, or even make and hang drawers (screw the drawer slides directly to the legs). Then you can go right to work. □

Douglas Campbell, a retired architect, is an avid woodworker in Asheville, N.C.

Put the shelf in place. *The toe kick and cam locks are already in place. The four dowels should fit into the router slots, supporting the shelf.*

Lock it in. *As you turn the cam in the shelf, the pin and leg are pulled tight, creating a rigid base for the top.*

Add the countertop. *After roughing out the corner radius of the countertop, screw it to the subtop from below, then rout the chipboard top flush to the subtop.*

Bring Your Shop into the

Great-room concept offers great advantages—both now and later

House

BY MARSHALL FLETCHER

Seamless addition. *Fletcher's new addition is a roomy workshop for him but will likely be a "great room" for the next owners. He consulted an architect to make sure the addition blended nicely with the house and created bonus spaces for outdoor living.*

I have been a woodworker for almost as long as I have been walking, and I've been through many shops, starting at my parents' home and then my own, both in my native South Africa and here in the United States. I have renovated, insulated, electrified, floored, and added windows and doors to garages and barns alike. I've built new structures and added on.

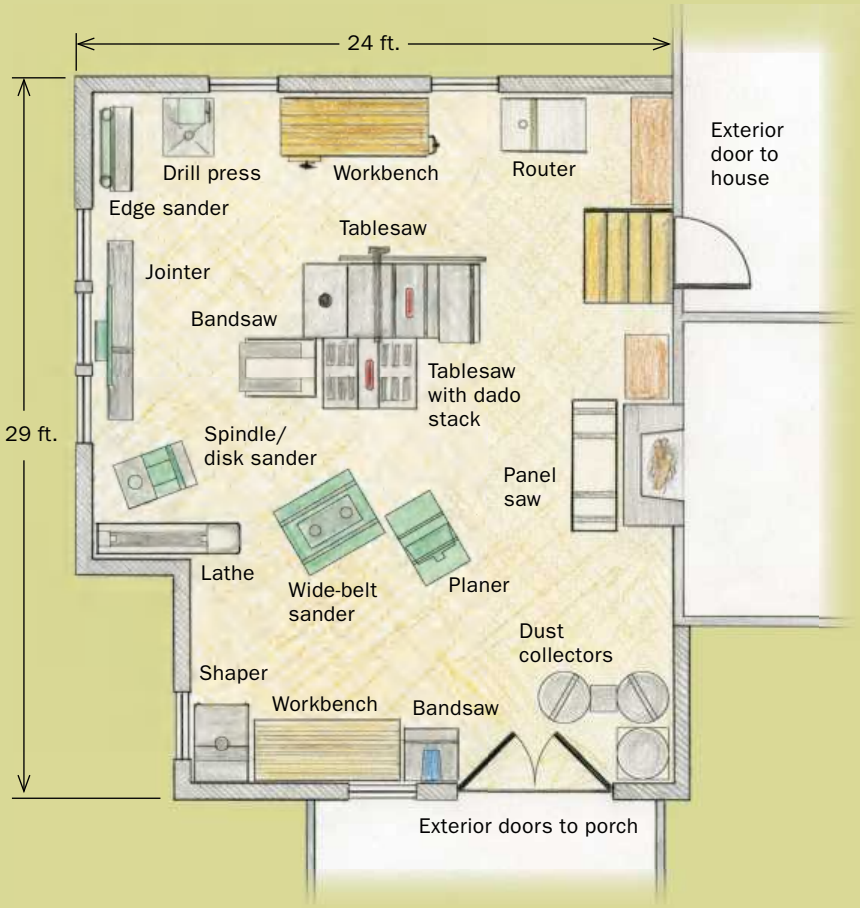
The outcome in all cases has been the same: When it came time to sell, I left money on the table. In my experience, nobody cares about how fine your garage or shed or barn is.

So when it was time to start over outside Chicago, I decided enough was enough. I had a little meeting with my wife and sold her on a new approach. My simple plan was to build an addition on the non-garage side of the house and effectively create a utility room, one that can very quickly and easily be converted into a beautiful great room when it is time to sell, simply by applying a fresh coat of paint, swapping out the lights, and dropping down some carpeting.

The outcome has been a fantastic success, with many benefits. For one, we appreciate the value added to the property, which made it possible to spend more and do the job right. By consulting an architect, we also improved the overall appearance of the house, for us and whoever follows. Second, the attached structure is far more energy efficient than a stand-alone would be, because of the shared walls and also the shop's insulating effect on the rest of the house. There are lots of other upsides. My wife loves it because it is easy to visit, and I appreciate the tea and cookies. My tools are all mobile, so we can use the space in other ways when the need arises. And last but not least, it is an awesome, comfortable workspace in all seasons.

INSIDE

Roomy and well-lit. *Fletcher built skylights and large windows into the design for plenty of natural light. High ceilings make the room more comfortable in the summer.*



Spend plenty of time on design

I did the first floor plan myself, placing stakes into the ground with connecting tape so we could live with it for a while and be sure it would enhance the outdoor space and not compromise the existing dwelling. I then provided a basic layout to an architect, including suggestions for the placement of windows and doors. He gave expert input, enhanced the design, and produced the construction drawings.

There were key decisions along the way. One was the type of floor: wood frame or slab. A framed floor must be designed for the weight of the machines. It could give you the advantage of extra basement space, but that could also increase the cost, requiring additional excavation and concrete. I did not want to disturb our existing basement walls, as we live near a river flood plain and have no current water problems, so I chose to build on a slab.

I went for a single level, with a high ceiling that still leaves the upper windows of the house unobstructed and creates appealing roof lines. But there is no reason why you couldn't build a second floor above a shop like this, adding living space or shop space.

When it came time to submit the plans for a building permit, I categorized the addition as a "seasonal recreation room," but was up front about the fact that it would be converted into a great room at some point. My local zoning board OK'd the plans and was super-cooperative throughout the building process. Overall it was comparable to building a garage or other structure.

How much you do yourself is a balance between speed and cost, and must take into account your skill level and what you are willing to try. I used a builder for the big stuff, but did a lot of the smaller jobs myself. By the way, I strongly suggest getting three prices before selecting a contractor, submitting the drawings to each one.

Make smart choices inside

For most workshops, power is a big consideration. I ran a new 220-volt feed to a subpanel in the shop. That saved me routing a lot of extra wiring through the existing structure.

One advantage of a great room over a basement shop is the ability to isolate noise and dust from the living space. Because this is an addition, you are dealing with fully insulated external walls, and no sound channels into the rest of the house. That's why I highly recommend installing an exterior door at the entrance to the room, which seals tight against noise, dust, and temperature.

It's also a good idea to keep heating separate to avoid airflow from shop to house, eliminating another highway for sound and dust. For now, I heat the shop with a wall-mounted, gas-fired heater on a thermostat. It is an externally vented unit so I do not get the smell of burnt dust or volatiles such as oil and varnish in the workspace. Because of the high ceiling volume, the room feels comfortable even in summer. Before selling the house I would trade the gas-fired heater for a split heating/cooling unit. The separate subpanel will make it an easy retrofit.

If your HVAC system is large enough for the additional square footage, and if the ducting design permits, you could run a feed-and-return duct to the new addition and just cap it for later. □

Marshall Fletcher, an engineer, lives in Libertyville, Ill.

A few tips

Bring an exterior door inside. *Used indoors, an exterior door's thickness and weatherstripping seals out noise and dust and prevents them from getting into living areas.*

Install a separate subpanel. *This lets you tie into the house's power supply with just one line, and ensures plenty of power for the shop (left).*

Simple solution for slabs. *DRIcore tiles (below) are affordable, widely available, and easy to install. They include a moisture barrier (concrete tends to wick moisture from below), and have plenty of weight capacity for heavy machinery. Fletcher applied a floor finish to his.*

Photos: Asa Christiana; drawings: Kelly J. Dunton

Essential hand-tool kit

ONE FURNITURE MAKER'S APPROACH

BY DAN FAIA

I've done all sorts of woodworking in my career, but hand tools have always played a large role. I cannot do my best work without them.

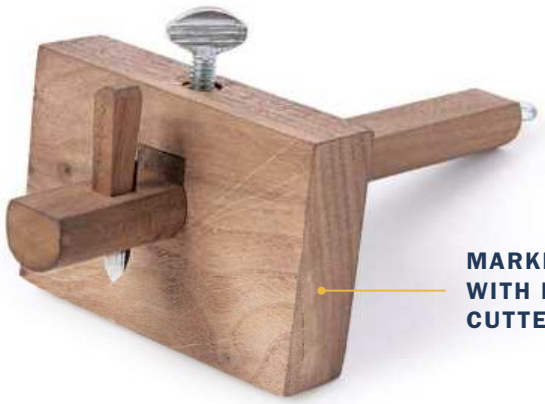
Whether working in the big shop at North Bennet Street School, where I teach, using an equal balance of power and hand, or working in my home shop almost exclusively at the bench, my set of essential hand tools is surprisingly similar.

While I was designing the compact tool rack featured on pp. 50-57, I gave serious thought to just which tools I rely on, the ones I reach for on a regular basis. Granted, I am a period furniture maker by trade, and I probably work with more curves and carving than the average woodworker. So you might be able to get away without a couple of the items on my list. And some woodworkers will want to add a block plane, for trimming small surfaces and making shaping cuts. I prefer to handle these tasks with the other tools in my kit, but the block plane can be very helpful. To see my kit in action, turn to the tool-rack project.

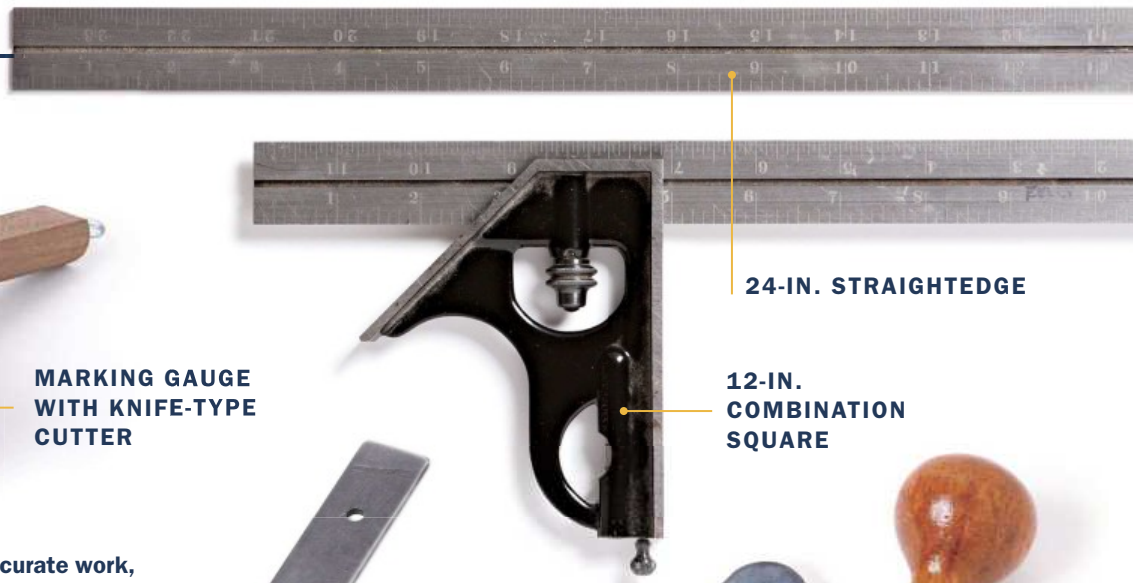
Dan Faia heads the Cabinet and Furniture Making Program at North Bennet Street School.

Photos: Asa Christiana

Layout

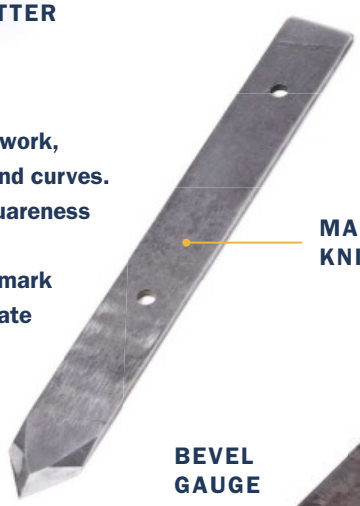


MARKING GAUGE WITH KNIFE-TYPE CUTTER

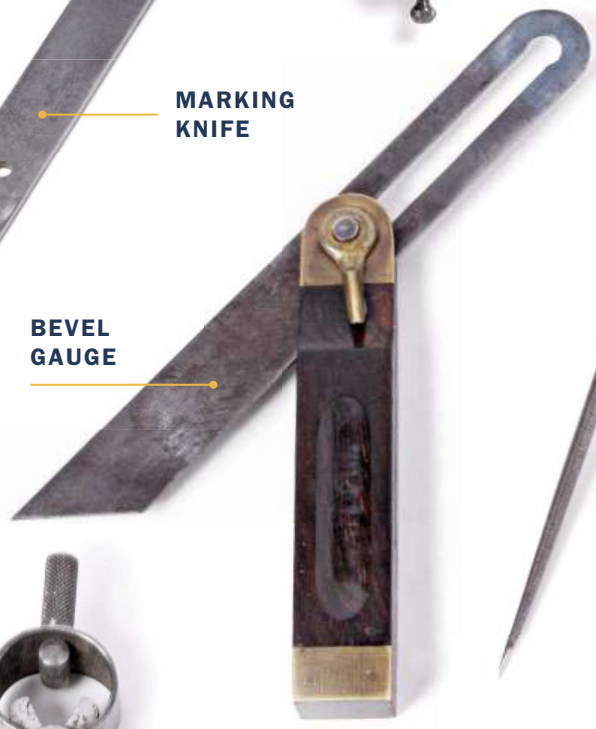


24-IN. STRAIGHTEDGE

12-IN. COMBINATION SQUARE



MARKING KNIFE



BEVEL GAUGE

AWL

DIVIDERS

COMPASS

Layout tools are the foundation for accurate work, helping me create precise joinery, angles, and curves. They also serve as important references for squareness and flatness.

The combination square is the primary benchmark in the shop. A machinist-quality model is accurate and easy to read. Its many tasks include measuring workpieces, checking them for flatness and squareness, laying out joinery, and setting up machinery.

At times I attach a 24-in. rule to my square, doubling its length for squaring the ends of wide boards and checking their overall flatness as well.

A traditional marking gauge uses a round pin, which can leave a jagged, inaccurate cut across the grain. Mine, called a cutting gauge, has a small, removable knife that is easily sharpened and slices wood fibers cleanly, leaving a perfect pocket to drop a chisel into for final paring. I also use it to cut inlay pieces from veneer.

Used often with the combination square, a marking knife performs the layout tasks that the marking gauge can't handle, leaving the same crisp, incised line. I like a double-beveled tip, which cuts in both directions.

While the combination square lays out 90° and 45° angles, the bevel gauge does everything in between. I use it when laying out dovetails, angled tenons, and beveled edges.

A pair of dividers is used to transfer dimensions or to space a series of marks evenly, for dovetail layout, for example. Any size or type is OK. The compass looks like dividers, but has a different job. It lays out circles and arcs, leaving a pencil line to guide my handwork.

I use the fine point of an awl to make a dent at the center of a hole, making it easy to drill in an exact location. The awl is also indispensable for precise screw locations when installing hardware.

Surface prep

Nothing prepares surfaces for finishing better or faster than hand tools. The No. 4 handplane is a shop workhorse that touches almost every surface. Unlike sandpaper, the plane maintains a flat surface and leaves a pristine cut, and does it quickly. I also like its mass and momentum for squaring and beveling edges, and shaping convex surfaces.

NO. 4 HANDPLANE

When lengths and widths of workpieces outmatch the No. 4, the No. 7 gets the job done. The long sole creates flawless edge joints on long pieces, and is great for truing doors and frames. This big plane is ideal for flattening large panels quickly.

NO. 7 HANDPLANE

For ornery grain, when the handplanes are leaving too much tearout, the card scraper steps in, reducing the amount of sanding required. It is also invaluable for flushing veneers and inlay without damaging the surrounding surface. I use curved card scrapers (called gooseneck scrapers) to smooth moldings and other curves.

CARD SCRAPER

A cabinet scraper, based on the Stanley No. 80, scrapes in a more systematic way than the humble card scraper, making it easier to maintain a flat surface. It is not an everyday player in the kit, but it does an incredible job on large surfaces with difficult grain.

CABINET SCRAPER

To sharpen scrapers of all kinds, you need a burnisher. They come in many shapes: round, triangular, and teardrop. I prefer the round, tapered type, which has a pointed tip that I use to realign the burr.

BURNISHER

Joinery

Forming joinery is job one for the following list of tools, which make a wide variety of helpful cuts.

To make straight joinery cuts, you need two saws. The dovetail saw cuts cleanly and efficiently with the grain. I use it mostly to cut dovetails and tenon cheeks. The carcase saw handles bigger jobs that require more cutting length and depth. I use it to cut tenon shoulders and dadoes, and also to cut parts to length, mitered or square.

Not as precise as the first two saws, the coping saw is a highly underrated tool. It is great for removing rough material when cutting joints, but it's also useful for cutting curves. A good-quality blade makes all the difference. I recommend the Stanley Trojan blades, with 15 tpi (teeth per inch). They work well on both hardwoods and softwoods.

A set of five chisels (¼ in., ⅜ in., ½ in., ¾ in., and 1 in.) is adequate for most tasks in the shop, from chopping and paring joinery to shaping wood. By far, the 1-in. chisel is the most used in my set. Round out your basic chisel kit with a 1-in. paring chisel. Its longer, thinner blade fits into tight quarters and reaches far beyond a standard chisel. I use it to trim tenon cheeks, and for all sorts of shaping cuts, from curves to chamfers.

Fitting joinery is one of the most important and fundamental tasks in furniture making. A shoulder plane, designed to pare surfaces precisely all the way into a corner, brings a wonderful level of precision to this task, making it easy to fit tenons, rabbets, and much more. It will become a go-to tool in your kit.

The router plane is a very versatile tool. Its sole rests on the surface of the work, with a cutter hanging down to produce a surface parallel to the top one. It's great for cutting pockets for inlay, refining the bottoms of dadoes, and relieving the background of a carving. I use a large model for larger areas, and a small model with a ⅛-in.-wide cutter. The small plane can ride on narrower surfaces for more delicate inlay and hardware jobs.

Shaping

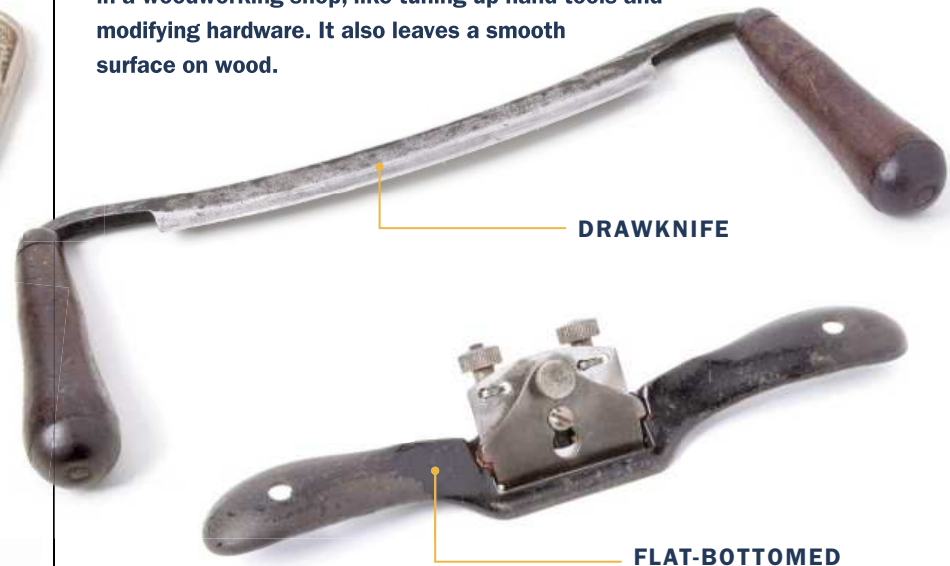
The following tools shape wood in various ways, from rough to refined. If your work doesn't involve many 3-D curves, you can probably get away without the drawknife and rasp.

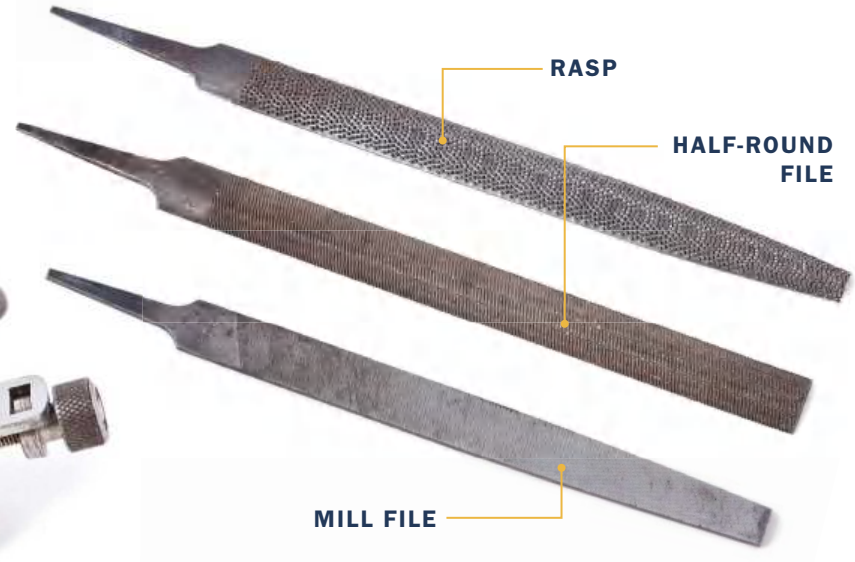
The drawknife is good for more than shaping green wood, its traditional job. It makes quick work of bevels, roughing them out before a shave or plane takes over. And it's great for sculpting 3-D surfaces such as a cabriole leg.

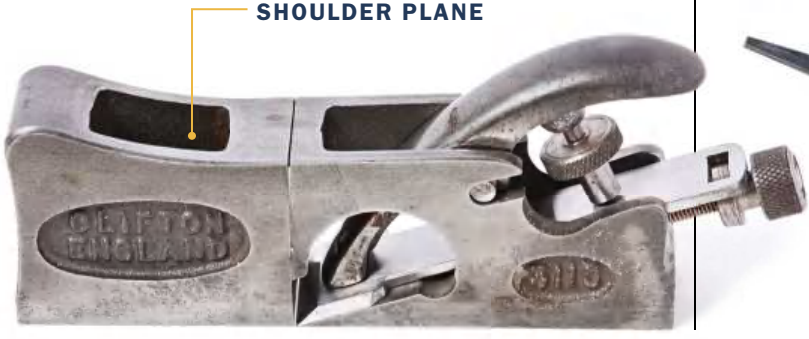
A standard metal-bodied spokeshave is a planing tool with a short, flat sole, ideal for smoothing and refining the curved cuts of a bandsaw, coping saw, or drawknife.

The cabinetmaker's rasp is used like a drawknife or spokeshave to form and refine curves of any shape, but its abrading cut makes it better on difficult grain. Use a half-round file to refine the surface left by the rasp, or simply to shape a surface where the rasp would be too aggressive. I like the double-cut pattern.

A second file, the mill file, is a must-have for the inevitable metalwork in a woodworking shop, like tuning up hand tools and modifying hardware. It also leaves a smooth surface on wood.



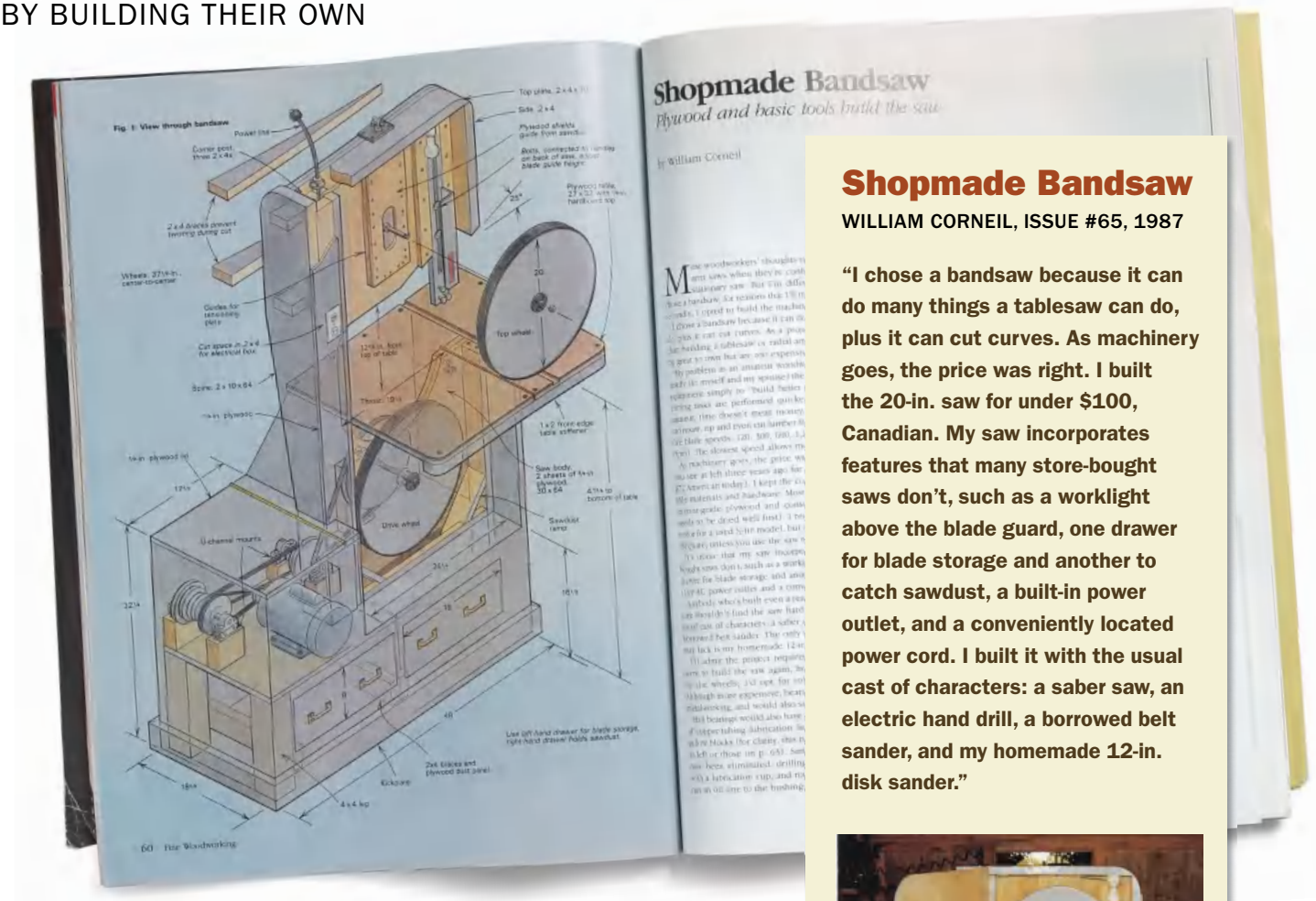




looking back

The era of manmade machines

A GENERATION OF WOODWORKERS OVERCAME THE HIGH COST OF MACHINERY BY BUILDING THEIR OWN



When it comes to outfitting our shops, today's woodworkers have a lot of affordable machinery options. But that wasn't always the case. Before amateur DIY and woodworking went relatively mainstream, woodworking machinery manufacturers served primarily a pro audience, which meant that prices often were out of reach for many hobbyists, and availability was limited. The solution for some woodworkers was to build their own machines. *Fine Woodworking* published a number of project articles from these enterprising woodworkers, who created astounding, functional machines from hardwoods, sheet goods, spare parts, and used motors.

This issue's Looking Back highlights a few of those shopmade successes, with short excerpts from each article, explaining why or how each machine was made. One of the projects, the bandsaw above, offered plans for sale, and we still occasionally get requests for them. Another, the lathe on p. 86, actually graced our front cover.

—Tom McKenna, editor

Shopmade Bandsaw

WILLIAM CORNEIL, ISSUE #65, 1987

"I chose a bandsaw because it can do many things a tablesaw can do, plus it can cut curves. As machinery goes, the price was right. I built the 20-in. saw for under $100, Canadian. My saw incorporates features that many store-bought saws don't, such as a worklight above the blade guard, one drawer for blade storage and another to catch sawdust, a built-in power outlet, and a conveniently located power cord. I built it with the usual cast of characters: a saber saw, an electric hand drill, a borrowed belt sander, and my homemade 12-in. disk sander."

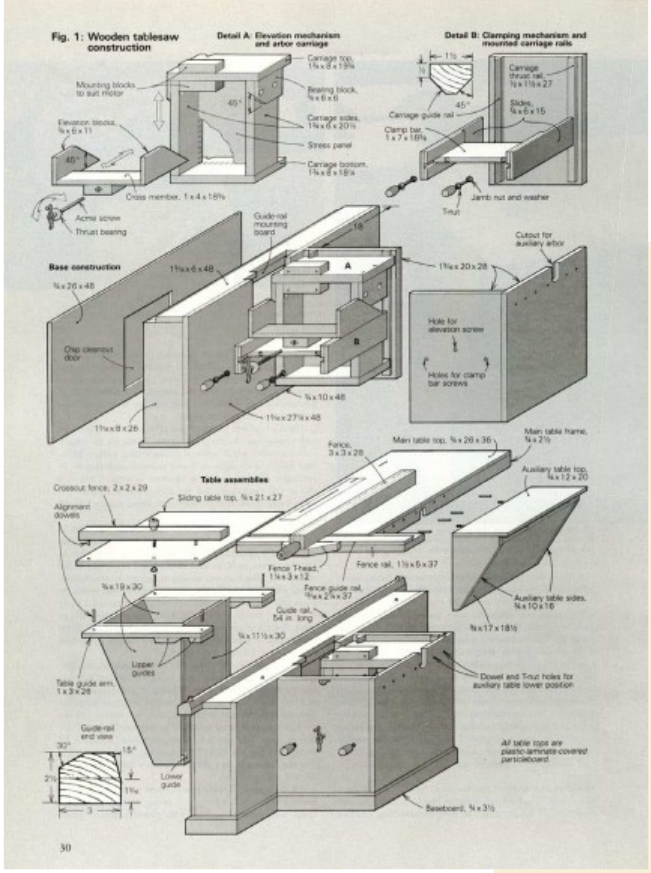
Article Extra

Read each of these articles in their entirety, for free

Wooden Jointer

GALEN WINCHIP, ISSUE #28, 1981

"Seven years ago I walked into a local hardware store to buy an odd assortment of stuff. 'What are you going to make?' asked the quizzical gentleman waiting on me. 'A wooden jointer,' I replied, trying to sound confident. He was both astonished and skeptical, and did his best to persuade me to buy the jointer on display in the store. Despite his warning, I bought the items on my list and thus embarked on my first tool-building venture. I tested five designs before I arrived at the design shown here. Its performance rivals that of an industrially produced machine, though its price (about $350) is considerably less and its feel and appearance are friendlier."



A Wooden Tablesaw

GALEN WINCHIP, ISSUE #41, 1983

"The only way I'd own a sliding tablesaw was if I designed and built one myself out of wood. I had already constructed a half-dozen wooden machines. Like a vintage wooden handplane, they have the friendly feel that's absent from their cast-iron counterparts. You can modify the saw to suit your needs. After I'd built my saw, alternatives and modifications kept coming to mind, and because I've included these changes in the drawings, the photos and drawings don't correspond exactly."

Photo, opposite page: William Corneil; this page: staff

Shopmade Lathes

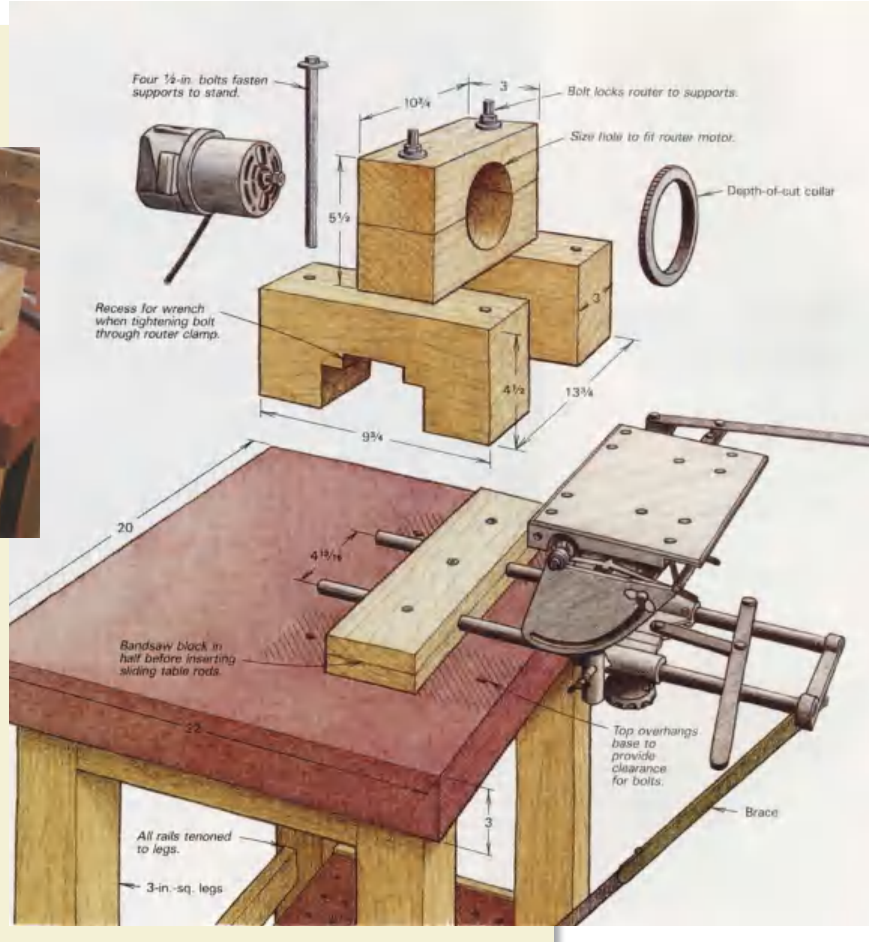
CARLYLE LYNCH, ISSUE #57, 1986

"I designed and built this lathe to turn everything from chessmen and chair rungs to tall bedposts. The materials cost $179.25 including $30 for a used ½-hp motor, but not including some scraps of plywood and oak left over from other jobs. The spindles are made from machine steel tubing, which I threaded and reamed to a #2 Morse taper so standard Delta lathe accessories will fit. I finished the lathe with shellac and bolted it to the floor with angle irons, to keep vibration down."

Mortising Machine

SAMUEL BUTLER, ISSUE #60, 1986

"The speed and accuracy of a horizontal milling machine make it an important mortising tool for anyone who builds a lot of furniture. Commercially available machines cost more than $2,000, but for about $270 I combined my Bosch 2¼ hp router and a stock Inca mortising table to come up with the sturdy home-built model shown here. The table can move back and forth enough to make a 4-in.-long mortise and up and down enough to cut a 2½-in.-wide mortise."



Photo, this page: staff

WOODWORKERS MART

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Shop-Built Thickness Sander

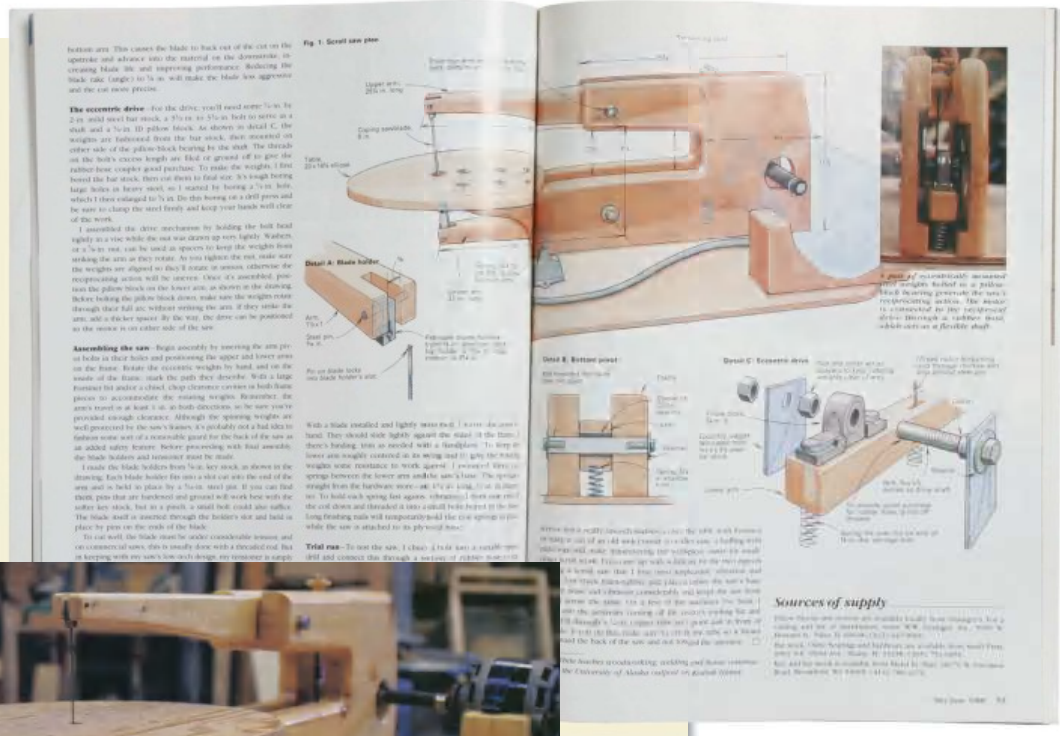
S.R. COOK, ISSUE #58, 1986

"As I spent more time with my digging-in, corner-dipping belt sander, I yearned for a better way to surface wood. This yearning became a necessity when I ended up with 1,500 bd. ft. of rough-sawn birch. I concluded that a power-feed drum sander was what I needed. The price was a bit of a snag, so I decided to build my own. It can sand panels up to 24 in. wide, all at a cost of $150 for parts and 50 hours assembly time."

Shopmade Scroll Saw

MARK WHITE, ISSUE #70, 1988

"My saw performs as well as any of the factory-made machines I've tried. I made it as simple as possible. It consists of two parallel wooden arms mounted on a rigid wooden frame and kept in tension by the blade at one end and a stout nylon cord at the other end. The blade is driven by a pair of eccentric, rotating weights attached to the lower arm with a shaft and pillow block. An old clothes-dryer motor drives a section of rubber hose that acts as a flexible shaft to spin the weights."



Photos, this page: staff (top); Marion Stirrup (bottom)

WOODWORKERS MART

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how they did it

Tools drive the design

DEDICATED WORKSTATIONS MAKE A MODEST SPACE EFFICIENT

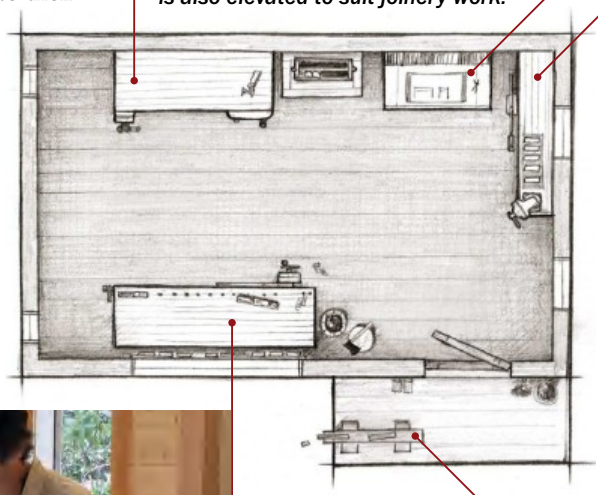
BY JONATHAN BINZEN

Jim Tolpin designed his 18-ft. by 11-ft. shop, he says, "to create the most efficient workspace possible for hand-tool woodworking." He divided the snug shop (see the back cover) into workstations—planing and boring on one bench, fine joinery on another, sharpening on a third—customizing the height, size, and workholding devices at each bench to their intended uses, and creating storage for the appropriate tools within arm's reach.

The shop's design was inspired in part by many visits to Colonial Williamsburg, where, Tolpin says, "I was always impressed by the beauty and simplicity of the shop buildings—and of the work the craftsmen were doing." He also noted that four traditional craftsmen could work efficiently in a very small space.

Finer work at a greater height. *The tall shoulder vise at Tolpin's joinery bench brings fine work up close. The benchtop is also elevated to suit joinery work.*

Draw and drop. *To conserve space, Tolpin built a stand-up drafting table that folds down when not needed.*



Get sharp. *Along with his ceramic stones and diamond plate, which live on a rubber mat, Tolpin's wall-mounted sharpening bench features a saw-sharpening vise and a task lamp with a magnifying lens.*

Perfect height for planing. *Tolpin placed his heavy-duty workbench, with its low height suited for sawing, chopping, and planing, beneath the large front window for maximum daylight on the work. By setting the bench away from the wall, he gained hanging space for a range of handsaws.*

Outdoor sawing. *A saw bench on the porch is where Tolpin cuts raw stock to rough size before taking it into the shop. The bench is also useful for roughing stock with a hatchet.*

Photos: Jonathan Binzen; drawing: John Tetreault

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Haven for Hand Tools

Jim Tolpin spent 30 years working wood to the buzz and whine of routers, sanders, tablesaws, and other implements essential to the efficient operation of the small production cabinet shop he ran in Port Townsend, Wash. Eventually, though, the noise and dust took the pleasure out of the profession, and Tolpin quit. It was a reacquaintance with hand-tool skills, which he'd first tasted during his days as a boatbuilder in the 1970s, that rekindled his desire to work with wood. The new pleasure also revived an old idea: "For years," he says, "I'd carried it around in my head that one day I'd have a shop that was quiet and clean and freestanding." That's just what he has now in his leafy side yard: a shop built expressly for using hand tools, with dedicated stations for sawing, planing, boring, and chiseling, and no space for power tools. Abel Dances, a carpenter who teaches at the Port Townsend School of Woodworking, where Tolpin is a co-director, built the shop with help from Tolpin and some recent graduates. They did much of the work with hand tools, right down to planing the exterior moldings with hollows and rounds. Since moving his tools into the shop a year ago, Tolpin has built, along with some furniture projects, the divided-light shop windows as well as the Dutch door, which he made with a stash of prime Honduras mahogany and a porthole, both remnants of his days building boats.

—Jonathan Binzen

Photo: Jonathan Binzen

How They Did It Turn to p. 90 to see how Tolpin divided the interior space into workstations.

Tolpin gives a tour of his shop in an exclusive audio slide show.